July 2021

Binder 162, Paramphistomatidae from Fishes A-J [Trematoda Taxon Notebooks]

Harold W. Manter Laboratory of Parasitology

Paramphistomatidae

AMUROTREMA Achmerov, 1959

Trematoda with almost cylindrical body, covered with wrinkled cuticula, unspined. Oral sucker deeply embedded, with two small diverticula. Acetabulum situated termiaally, circular and powerful. Genital pouch near to diverticula of oral sucker. Testes round or lobed, lying in equatorial zone slightly obliquely, near to one another. Uterus loops from near anterior border of acetabulum up to genital pouch, passing between intestinal ceca. Ovary spherical (globular), anterior to acetabulum. Vitellaria lie lateral in posterior half of body, between posterior region of ovary and the anterior region of the posterior testis. Excretory system represented by two large lateral canals, uniting behind oral sucker.

Intestinal parasites of fish.

Represented by a single species, A.dombrovskajae Achmerov, 1959.

Host: Ctenopharyngodon idella
a cyprinid fish

Locality: River Amur and Lakes Petropavlovsk, Bolon, Udyl.

Reference: Achmerov, A.H. 1959. "Scraper" Fish of Amur River. Work from Helminth. Lab. Acad. Sci., U.S.S.R., 9:23-44.

From: Guide to Parasites of Freshwater Fishes of USSR. Bychowsky, B.I. editor 1962. Pub. Zool. Inst. Acad. Sci. USSR. Guide to Fauna of USSR, pt. 50, 776 pp.

Paramphistomidae

Amurotrema dombrowskajae Akhmerov, 1959

see reprint in file

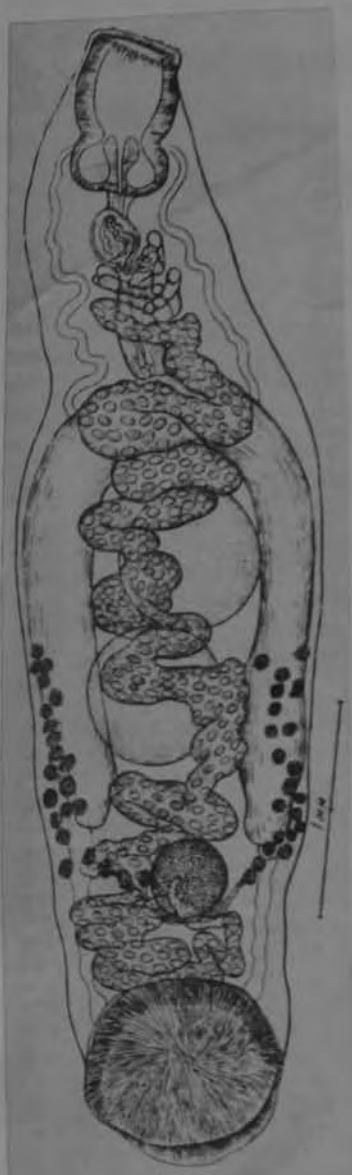

Рис. 1. *Amurotrema dombrowskajae* nov. gen. n. sp.
Половозрелый червь.

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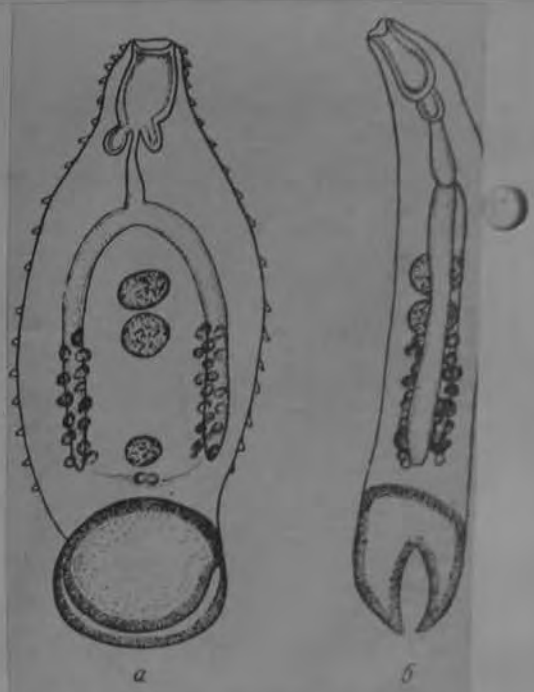


Рис. 2. *Amurotrema dombrowskajae* nov. gen. n.
а — неполовозрелый червь; б — то же, вид сбоку

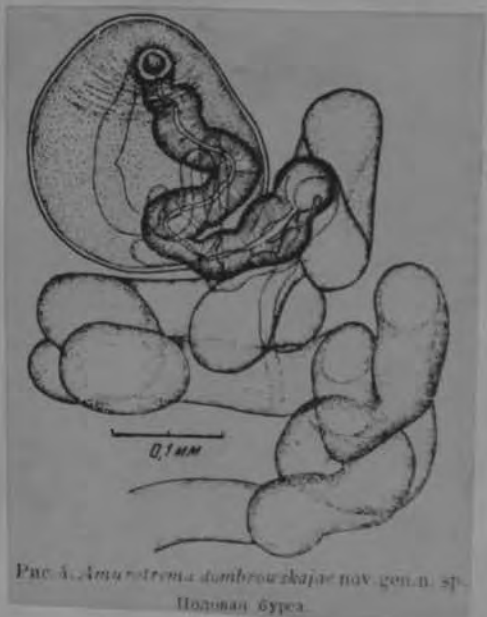
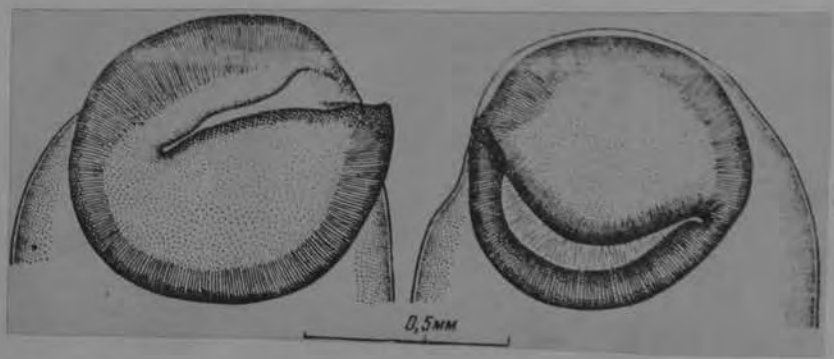


Рис. 3. *Amurotrema dombrowskajae* nov. gen. n. sp.
Половая бурса



AMUROTREMA

Bancroftrema Angel, 1966

Generic diagnosis

Pharynx with well-developed diverticula. Acetabulum without posterior notch or other elaborations. Esophagus slightly sinuous in dorsoventral plane, with dilatation immediately preceding large muscular bulb. Ceca with three undulations, terminating at acetabulum. Lymphatic vessels present. Genital pore postbifurcal, midway between cecal bifurcation and testes, opening into spherical atrium. Testes irregular in shape, symmetrical, intercecal, in anterior half of body; seminal vesicle short; cirrus sac a very thin membrane, enclosing prostatic cells, prostatic vesicle, and short cirrus. Ovary subspherical, near acetabulum; uterus intercecal; eggs large, thin-walled. Vitelline follicles mostly extracecal, from mid-body to acetabulum.

Type species: Bancroftrema neoceratodi.

COMPARISONS

Bancroftrema neoceratodi is the first amphistome from an Australian freshwater fish, and the first to be reported from a lungfish, although lungfishes occur also in South America and Africa where amphistomes are found in other freshwater fishes.

Nineteen genera and 28 species of amphistomes have been reported from fishes occurring in fresh water. Of the five genera having testes side by side (*Nicollodiscus* Srivastava, 1938, *Kalitrema* Travassos, 1933, *Brevicaecum* McClelland, 1957, *Helostomatis* Travassos, 1934, and *Caballeroia* Thapar, 1960), *Bancroftrema* most resembles *Helostomatis* and *Caballeroia*. *Helostomatis* includes two species, *H. helostomatis* (MacCallum, 1905), Travassos, 1934 and *H. sakrei* Bhalerao, 1937, both from freshwater fishes, from Sumatra and India respectively. It differs from *Bancroftrema* in the far anterior genital pore, which is surrounded by a "genital sucker," and in the acetabulum, which has a dorsal hood anteriorly. *Caballeroia* has only one species, *C. indica* Thapar, 1960, from India, which differs from *Bancroftrema neoceratodi* in having a prebifurcal genital pore, conspicuous cirrus sac, testes touching and slightly overlapping, papillae on cuticle of anterior part of body, and in lacking an esophageal bulb. Thus, *B. neoceratodi* appears to have its closest affinities with amphistomes from Sumatra and India.

Trematodes have not been recorded from South American lungfishes, but from African lungfishes the following trematodes have been reported: *Callodistomum diaphanum* Odhner, 1902 from *Polypterus bichir* Geoffr.; *Heterorchis protopteri* Thomas, 1958 and *H. crumenifer* Baylis, 1915 from *Protopterus annectens* Owen.

Parasites of *Neoceratodus* are of particular interest because this host is one of two primary division (strictly freshwater) fishes occurring in Australia. The parasites which have been recorded from this host are *Amphistoma* sp. (now described as *Bancroftrema neoceratodi*); a monogenean trematode, tentatively identified as a polystomatid (see Llewellyn, 1965); and nematodes, "*Ascaris*" sp. and *Amblyonema terdentatum* von Linstow, 1898.

ANGELL, 1966

Bancroftrema neoceratodi ~~gen. et sp. n~~
(Figs. 1–4)

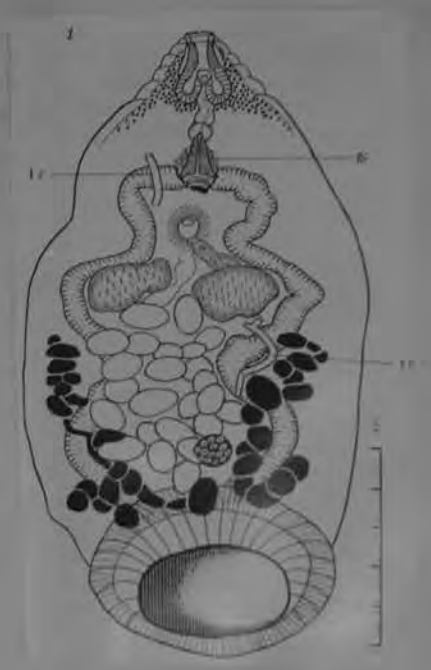
Host: Neoceratodus forsteri (Krefft, 1870).
Location: Digestive tract.
Locality: Burnett River, Queensland, Australia.
Type specimens deposited: South Australian Museum: holotype, No. E 814; 3 paratypes, Nos. E 815, 816, 817. (Juveniles, one sectioned.) USNM Helm. Coll. 2 paratypes (juveniles), No. 61344.

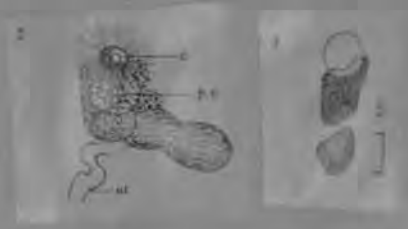
Description

Length 1.47 mm, width 0.75 mm. Cuticula of pharyngeal region annulated, evidently due to contraction. Mouth terminal, with eight small, conical papillae (four dorsal, four ventral), and a single larger dorsolateral papilla on each side. Acetabulum ventro-terminal; 394 from anterior to posterior rim, 523 wide. Pharynx with prominent diverticula; total length 166, width anterior to diverticula 84, width across diverticula 123, length of diverticula 72; no sphincters present; pharynx and diverticula lined with cuticle; esophagus 22 wide, sinuous in dorsoventral plane, widening to form distinct enlargement before opening into muscular bulb. Distance from junction of pharynx and esophagus to esophageal bulb 160. Esophageal bulb 104 long, 45 wide anteriorly, widening to 80 at posterior end. Ceca passing laterally (for distance of 170) before turning posteriorly; forming three symmetrical curves before terminating at anterior rim of acetabulum. Esophageal bulb with radial muscles; circular muscles not apparent in adult, but seen, weakly developed, in sections of immature specimens. Compact group of cells, apparently glandular, clustered at each side towards posterior end of esophageal bulb (Fig. 1); cells on each side connected by string of cells passing ventrally across ceca, with cluster of cells immediately posterior to cecal bifurcation; same three groups of cells and their connectives present in immature specimens.

Genital pore (Fig. 2) ventral, median, postbifurcal, midway between cecal bifurcation and testes; with cuticular rim, and radial muscles extending into parenchyma; atrium spherical, 43 in diameter. Testes side by side, irregular in shape, intercecal, slightly anterior to mid-body; right testis 128 long by 197 wide; left testis 163 by 197. Seminal vesicle short and convoluted, anterior to left testis. Prostatic vesicle 46 in diameter, spherical, lined with large vesicular cells and enclosed in mass of prostate cells bounded by thin membrane (= cirrus sac?). Cirrus short. Ovary subspherical, 64 long by 78 wide; slightly to left of midline, just anterior to acetabulum. Uterus occupying intercecal area from acetabulum to testes. Eggs from 112 by 59 to 128 by 69. Vitelline follicles irregular in shape, measuring up to 80 by 56; extending from mid-body to acetabulum, extracecal anteriorly and posteriorly, with intercecal extension posteriorly. Laurer's canal not seen in adult, but visible in several immature specimens.

Excretory pore median, on dorsal surface, posterior to tips of ceca. Lymphatic space surrounding much of pharynx, with extensions on each side of esophagus; at least one pair of longitudinal canals opening into pharyngeal lymphatic space.





Lymphatic system

Observations are based on adult, immature specimens and sections of immature specimens.

In one of the sections of the frontal series, and in three of the whole immature specimens, a large pyriform nucleus with a well-defined nucleolus is seen on each side in the posterior lateral wall of the lymphatic space (Fig. 4). The nucleus bears a close resemblance to that figured by Ozaki (1937, p. 164, fig. 24) in *Hexangium sigani* (Angiodictyidae) and identified as the nucleus of the lymphatic canal. Ozaki found one of these nuclei in each canal, of which there were three pairs. However, Looss (1902), as cited by Ozaki (p. 158), stated that in the Angiodictyidae each lymphatic canal contained a single "nucleus-like spherule," while in the paramphistomes there were numerous cellular elements. Moreover, Ozaki (p. 164) apparently considered the nucleus to be suspended in the lymph in *Hexangium*, as in Gyliauchenidae (p. 148). The nuclei seen in *Bancroftrema neoceratodi*, although they appear to project into the cavity, are attached to the tissue surrounding the lymphatic space. If they are indeed the nuclei of lymphatic canals, it would seem to indicate that, at least in immature forms, there is a single lymphatic canal on each side of the body. Similar nuclei have not been reported in the lymphatic systems of any other amphistomes which have been described. Willey (1930, 1933), who studied in detail the lymphatic systems of some amphistomes from fishes, amphibians and mammals, reported that the walls of the lymphatic vessels appeared to be entirely membranous in structure, possessing no muscle fibers, nuclei, or cell boundaries of any sort.

At the anterior end of the body, surrounding the lymphatic space, the parenchymal cells appear to be much smaller than elsewhere; this is indicated by a dense concentration of nuclei which are indistinguishable from those of the large parenchymal cells. Further concentrations of such nuclei surround the posterior extensions of the lymphatic space (Fig. 4, *ext.*), in which the acellular contents are stained. Posteriorly, a branch of the lymphatic system on each side of the body comes into close contact with the excretory bladder.

Immature specimens

The 15 immature specimens varied in size from 354 by 143 to 660 by 197, but nevertheless showed no differences in the stage of development of the reproductive system. It seems likely that they resulted from a simultaneous infection, and were probably recently excysted metacercariae. Two specimens were sectioned, in frontal and sagittal series, respectively.

Very small, yellow to dark brown pigment granules are scattered throughout the body, more concentrated in the anterior half, particularly in the region of the pharynx. Traces of the eyespots are present in some specimens; in one there are distinct, elongated masses of pigment with a more or less circular clear area fitting into a depression anteriorly (Fig. 3). Isseroff (1964), in a study of the fine structure of the eyespot in the miracidium of *Philophthalmus megalurus* (Cort, 1914) states that the so-called lenses are the bulbous portions of the sensory cells at the opening of the pigment cup, where the cytoplasm is distinctive in appearance and contains fewer mitochondria than elsewhere. The appearance of the eyespots in my specimen suggests that such an arrangement exists also in at least some cercariae.

Sections of the gut show the epithelial cells to be cuboidal or somewhat flattened, with prominent nuclei and numerous long microvilli projecting from the inner surfaces. The microvilli are like those described by Wotten and Sogandares-Bernal (1963) for *Cleptodiscus kyphosi* Sogandares-Bernal, 1959, and *C. reticulatus* Linton, 1910. The reproductive system consists of undifferentiated cells, but the main regions are represented.

Protozoa in ceca

The lumen of the gut of all the immature specimens contained what appeared to be flagellate protozoans, 10.5 by 7. These varied in number from few to more than 60 in one specimen. It is a matter for conjecture whether these were parasitic in the gut of the trematodes, or were actively ingested by them.

Manter (1930) reported small protozoa about the size and shape of *Chilomastix* in the ceca of *Lepocreadium trulla* (Linton, 1907) Linton, 1910 from the yellow tail, *Ocyurus chrysurus* (Bloch). Although the flagellum could not be observed, the organisms swam actively and seemed to be flagellates. They were found a number of times on different dates; smears of the intestinal contents of the fish did not show any protozoa.

Neoceratodus includes vegetable matter in its diet, and flagellate organisms could well have been ingested with this. According to the label on the vial, the amphistomes were taken from the stomach of the fish. The fact that a few diatoms were also observed in the ceca of some of the trematodes perhaps supports the view that the protozoans had been ingested by the latter. However, the protozoans were well preserved cytologically and showed no sign of digestion or maceration, as would be expected from even brief contact with gastric juice. As far as could be seen in the whole mount, there were no organisms in the gut of the adult *Bancroftrema neoceratodi*. Dollfus (1946, pp. 36–37) recorded that *Opalina* was ingested, sometimes in great abundance, by *Diplodiscus* in the rectum of amphibians.

"Amphistomes from stomach of *Neoceratodus*, Queensland, 1/1911. Dr. T. L. Bancroft." This is obviously the collection for which Johnston's record was given. It contained one adult and 15 immature specimens.

The following description is based on the single adult, with corroborative details from the immature specimens, two of which were sectioned. Measurements are in microns unless otherwise indicated.

In 1913, T. H. Johnston reported that Dr. T. L. Bancroft had found "a few specimens of a small *Amphistoma*" in the spiral valve of *Neoceratodus forsteri*. The nematode which was also present, had been found commonly in *N. forsteri* but *Amphistoma* sp. was found only once. Recently we found among the Professor Johnston's helminthological material (U.Q. 1058) a small tube labeled

Basidiodiscus, n. gen. Fischtal & Kuntz, 1959

DIAGNOSIS: Paramphistomidae. Body conical. Oral sucker terminal, with paired saccular pharyngeal diverticulae. Esophagus with posterior bulb. Ceca simple, terminating short of posterior extremity. Acetabulum terminal, much like a pedestal, with many papilliform projections on its bottom. Testes 2, slightly oblique, widely separated, one extracecal at anterior third and other intercecal at middle of body. Cirrus pouch present. Genital pore mid-ventral, nearer to oral sucker than esophageal bulb. No genital sucker. Ovary mid-ventral, posttesticular and postcecal. Laurer's canal present. Uterine coils inter-, extra-, pre-, and postcecal. Vitelline follicles lateral, beginning at level of posterior testis or entirely posttesticular. Excretory vesicle with posterodorsal opening. Lymph system present. Intestinal parasite of fishes.

Basidiodiscus ectorchis, n. sp. Fischtal & Kuntz, 1959

DIAGNOSIS: Body conical, anterior end rounded. Oral sucker terminal, mouth tilted slightly ventral. No oral papillae. Pharyngeal diverticulae 2, saccular, thick-walled, dorso-lateral to esophagus. Esophagus elongate, dorsal to anterior testis, terminating in muscular bulb at intestinal bifurcation; latter at level of posterior portion of anterior testis. Ceca simple, dorsal, terminating short of posterior extremity. Acetabulum terminal, much like a pedestal, tilted slightly ventral, with outer edge rolled down slightly; 12 prominent papilliform projections on its bottom, 11 in outer ring and 1 ventrally within ring. Pigment granules of disintegrated cercarial eyespots distributed in all directions from around oral sucker to ends of ceca.

Testes 2, smooth, slightly oblique, widely separated, amphitypic. Anterior testis longitudinally elongate, at anterior third of body length, extracecal, mostly anterior to but slightly overlapping intestinal bifurcation ventrally. Posterior testis transversely elongate, at middle of body length, intercecal, occasionally overlapping cecum ventrally, entirely anterior to ends of ceca. Vas efferens of posterior testis arises from antero-dorsal margin, ascending body dorsal to anterior testis and ventral to esophagus. Vas efferens of anterior testis arises from antero-median margin, being joined immediately by other vas efferens. Vas deferens is inflated into seminal vesicle before entering cirrus pouch. Cirrus winding, opening into shallow genital atrium. Vas deferens, seminal vesicle, and cirrus pouch amphitypic, ascending from right if anterior testis on left or vice versa. Genital pore mid-ventral, nearer to oral sucker than esophageal bulb, anterior to or rarely under anterior portion of anterior testis, without genital sucker.

Ovary mid-ventral, posttesticular and postcecal near posterior end of body, elongate, smaller than either testis. Oviduct arises from postero-dorsal margin, passing dorsally to form short loop, then ventrally into ootype lying near posterior end of ovary and occasionally overlapping it slightly; oviduct expands into uterus a short distance farther. Ootype complex contains well-developed Mehlis' gland, common vitelline duct, and Laurer's canal contacting left margin of body. Uterine coils inter-, extra-, pre-, and postcecal, lying dorsal to posterior testis, ventral to portion of anterior testis nearest mid-line of body, and anterior to intestinal bifurcation. Metraterm thick-walled, ventral to cirrus pouch, opening into genital atrium. Uterus (opposite anterior testis) and metraterm amphitypic, ascending from right if anterior testis on left or vice versa. Eggs large, thick-shelled, operculate, containing miracidia. Vitelline follicles lateral, beginning at level of posterior testis or entirely posttesticular, ventral to ceca, terminating postcecally at level of ovary. Vitelline duct arises from each viltelline field, joining mid-ventrally to form short common vitelline duct.

Excretory vesicle with postero-dorsal opening. Lymph system present.

Mean measurements in millimeters (with minima and maxima in parentheses) of 10 whole mount adults from *Synodontis schall* are: body, length 2.005 (1.544-2.580), width 0.596 (0.416-0.739); oral sucker, 0.256 (0.200-0.330) x 0.200 (0.139-0.271); pharyngeal diverticulae, 0.076 (0.056-0.090) x 0.103 (0.090-0.114); esophagus, length 0.474 (0.403-0.574); esophageal bulb, 0.122 (0.099-0.165) x 0.083 (0.070-0.092); acetabulum, width 0.975 (0.792-1.162); anterior testis, 0.327 (0.231-0.389) x 0.298 (0.231-0.350); posterior testis, 0.286 (0.231-0.370) x 0.309 (0.231-0.416); cirrus pouch, length 0.114 (0.105-0.135); ovary, length (from 1 sagittally sectioned worm) 0.185, width (from 1 cross sectioned worm) 0.119; older intrauterine eggs, 0.167 (0.158-0.178) x 0.097 (0.093-0.099); anterior end to genital pore, 0.359 (0.290-0.448); anterior end to anterior testis, 0.415 (0.363-0.541); anterior end to posterior testis, 0.954 (0.760-1.208).

Proc. Helm Soc. 26(1):32-37.

Measurements of 1 whole mount adult from *Mormyrus kannume nre*: body, 1.597 x 0.409; oral sucker, 0.198 x 0.145; pharyngeal diverticulae, 0.063 x 0.080; esophagus, length 0.330; acetabulum, width 0.700; anterior testis, diameter 0.211; posterior testis, diameter 0.198; anterior end to genital pore, 0.297; anterior end to anterior testis, 0.356; anterior end to posterior testis, 0.719.

HOSTS: ***Synodontis schall* and *Mormyrus kannume*, freshwater fishes (families Synodontidae and Mormyridae, respectively).**

HABITAT: **Small intestine.**

LOCALITY: **Giza Fish Market, Giza Province, Egypt.**

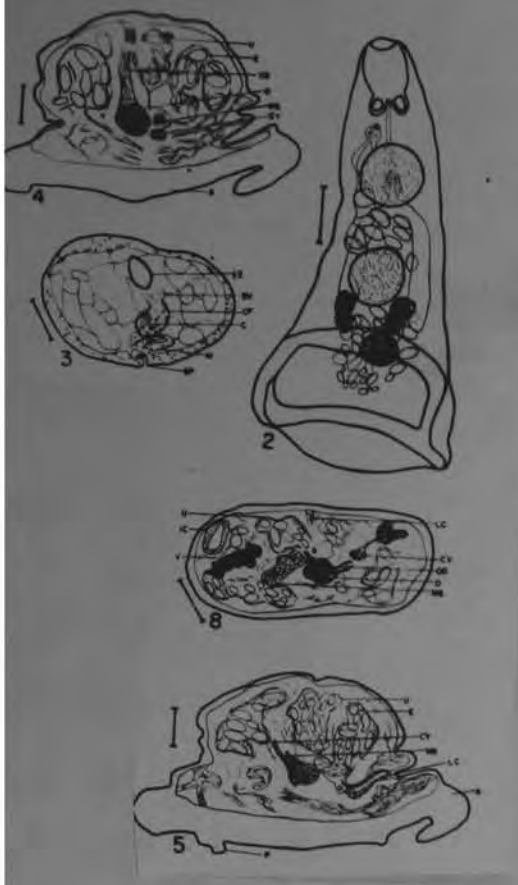
TYPE: **U. S. Nat. Mus. Helm. Coll., No. 38291 (1 whole mount slide of type and paratype from *S. schall*, 3 slides of 1 worm from *S. schall* in serial sagittal section and 3 slides of another in serial cross section), and No. 38292 (1 whole mount slide of paratype from *Mormyrus kannume*).**

The generic name (Gr. *basis*, pedestal + *diskos*, disc) refers to the pedestal-like form of the acetabulum. The specific name (Gr. *ectos*, outside + *orchis*, testis) refers to the extracecal position of the anterior testis.

Specimens from 3 *S. schall* were collected on September 6 and 13, 1952, and August 23, 1953, respectively, in mixed infection with *Sandonia* described below.. The one adult from *M. kannume* was taken on September 20, 1952.

Of the 10 *B. ectorchis* measured from *S. schall*, 7 had the anterior testis on the right and 3 on the left, indicating that amphitypy is of frequent occurrence. The anterior testis was on the left in the worm from *M. kannume*.

Yamaguti (1953) lists 16 genera of Paramphistomidae from fish hosts. McClelland (1957) added the genera *Sandonia* and *Brevicaecum*. *Basidiodiscus* differs from all these genera in having its terminal acetabulum in the form of a pedestal-like appendage much wider than the base of the body. In having one testis extracecal and the other intercecal, *Basidiodiscus* further differs from all genera from fish hosts with the exception of *Sandonia*.



BASIDIODISCUS

BREVICAECUM McClelland, 1957

Genus : ***Brevicaecum.***

Generic diagnosis : Body elongate, dorso-ventrally flattened. Cuticle without spines. Mouth terminal, pharynx with large primary sacs. Oesophagus short, straight, with bulb immediately in front of bifurcation. Caeca straight, reaching only slightly beyond mid-point of body. Acetabulum ventral, at extreme end of body, aperture round or oval. Testes oval with smooth or lobed margins, at level of bifurcation of gut, external to or overlapping caeca. Genital aperture median, at level of posterior end of pharyngeal sacs. No cirrus sac. Ovary round or oval, roughly median, just behind termination of caeca. Receptaculum seminis present. Laurer's canal vertical, straight. Vitellaria follicular, lateral to ovary. Uterus mainly pre-ovarian.

Type species : ***Brevicaecum niloticum.***

Host: ***Citharinus citharus.*** (Characidae)

Position : Intestine.

Locality : River Nile, Khartoum, Sudan.

The type specimens have been returned to the British Museum (Natural History).

Brevicaecum McClelland, 1957

Generic diagnosis : Body elongate, circular in cross section. Cuticle without spines. Mouth terminal. Acetabulum terminal with round or oval aperture. Pharynx with large primary sacs. Oesophagus short terminating in a bulb. Caeca wide, extending slightly beyond mid-length of the body. Testes round or oval with smooth margins, at level of oesophageal bifurcation and overlapping the caeca. Genital aperture median at level of posterior end of pharyngeal sacs. No cirrus sac. Ovary round, roughly median, slightly posterior to the caeca. Receptaculum seminis absent. Laurer's canal present. Vitellaria follicular, lateral to the ovary. Uterus mainly pre-ovarian. Excretory vesicle Y-shaped. Lymph system present. Parasites of freshwater fishes. Type species ***Brevicaecum niloticum*** McClelland, 1957.

The classification of the family Paramphistomidae Fischoeder, 1901, is not an easy one and in spite of the several attempts and publications by different authors, a satisfactory system of classification does not exist.

When McClelland (1957) erected the genus *Brevicaecum* he attached it to the subfamily Kalitrematinae Travassos, 1933. He admitted some doubt as to the correctness of this decision. In fact there is very little in common between the genus *Brevicaecum* and the genus *Kalitrema* Travassos, 1933, the genotype and only genus of the subfamily Kalitrematinae. *Brevicaecum* differs from *Kalitrema* in the general shape of the body, the absence of a transverse ridge at neck, the acetabulum not at base of a caudal notch and not small, the

(OVER)

presence of an oesophageal bulb, the extension of the vitellaria mainly posterior to the intestinal caeca, the median position of the ovary, the shape and position of the testes and the absence of a genital sucker. The main character that persuaded McClelland to assign the genus *Brevicaecum* to the subfamily Kalitrematinae is the apparently extra-caecal position of the testes which in fact does not occur in the genus *Brevicaecum* as the writer explained above.

From the above differences the genus *Brevicaecum* can not be assigned to the subfamily Kalitrematinae but none of the existing subfamilies of the family Paramphistomidae can accommodate it.

Although the writer is reluctant to erect a new subfamily for this genus, it seems to be unavoidable and consequently the subfamily Brevicaecinae is proposed for it. However, this is not an isolated case, for there is more than one subfamily in the family Paramphistomidae with one genus and one species only, especially from fishes.

FROM KHALIL (1963)

The material available consisted of nine whole mounts, five series of longitudinal sections and one series of transverse sections. Not all the series were complete, and all the longitudinal sections were oblique. All this material was collected by Dr. Woodland from the intestine of *Citharinus citharus* at Khartoum between 1913 and 1918, and kindly lent by the British Museum (Natural History).

The body is oval in outline, 6·4–14·2 mm. in length, with a maximum breadth of 1·30–3·85 mm. attained roughly half-way along the worm. The maximum thickness of the body as determined by the measurement of sections, is about 1·3–2·2 mm. The body is entirely without cuticular spines.

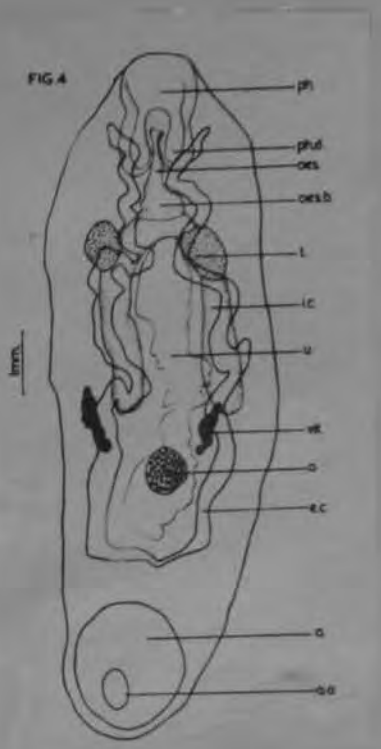
The acetabulum is ventral in position, at the posterior end of the body, and round or oval in outline, 1·17–1·96 mm. long and 1·27–1·68 mm. in breadth. The aperture is round or oval, sometimes triangular, but not as regularly elongate as in the genus described above.

The mouth is anterior and terminal, leading to a large pharynx with a pair or large primary pharyngeal sacs opening posterodorsally, one on either side of the oesophagus which is short and runs straight posteriorly to the intestinal bifurcation. Immediately anterior to the bifurcation of the gut there is a thick-walled oesophageal bulb. The intestinal caeca run straight posteriorly, terminating only slightly behind the mid-length of the body.

The testes are relatively small, situated one on either side of the body at, or slightly behind the level of the intestinal bifurcation. They are usually oval in outline, measuring 0·35–0·75 × 0·29–0·58 mm. with entire margins except in a very few cases. Normally the testes are lateral to the intestinal caeca, but sometimes overlap these structures. In some specimens one testis appeared to lie between the caeca, but evidently this was an artefact due to distortion of the worm during preparation. The vasa efferentia and vas deferens are greatly coiled. The latter opens at the genital aperture. No cirrus sac or seminal vesicle could be found.

The genital aperture is median and lies anterior to the oesophageal bulb and just in front of the posterior ends of the pharyngeal sacs.

The ovary is round or oval with a smooth margin and is roughly median, lying just posterior to the termination of the intestinal caeca or mid-way between their termination and the anterior edge of the acetabulum. The receptaculum seminis is small and lies near, and slightly dorsal to the ovary. Laurer's canal is almost straight,



running dorsally from the receptaculum seminis to open on the dorsal side of the body. The vitellaria are lateral to the ovary and lie, one group on each side of the body, immediately posterior to the intestinal caeca. The uterus is almost entirely pre-ovarian, lying in loops between the intestinal caeca, and is packed with eggs. The metraterm opens with the vas deferens at the genital aperature. The dimensions of the eggs could not be determined owing to the complete absence of unmounted material.

The excretory system consists of four longitudinal canals, one dorsal and one ventral to each intestinal caecum. There is a small median vesicle at the posterior end of the body with a median canal which opens on the dorsal surface of the body slightly anterior to the acetabulum. It appears that the two excretory vessels on each side of the body are not always clearly distinguishable, particularly posterior to the termination of the intestinal caeca, suggesting that anastomoses may occur, but it was not possible to establish this fact by study of the sectioned material available.

Systematic Position and Affinities

The determination of the systematic position of this genus presented some difficulty. The position of the genital aperture, the absence of a cirrus sac, the shortness of the intestinal caeca and, above all, the position of the testes lateral to the intestinal caeca are all rather uncommon features. However, this last characteristic provided the solution to the problem.

In 1933 Travassos described an unusual amphistome obtained from the intestine of a Brazilian freshwater fish which he named *Kalitrema kalitrema* and for which he erected a subfamily Kalitrematinae. Näsmark was aware of the existence of this form (p. 430), but completely omitted it from his classification, presumably because he could not examine any specimens himself. Although *Kalitrema* and *Brevicaecum* differ in certain respects, the general similarity between the two is striking. Thus, in both, the testes are extra-caecal and at the level of the intestinal bifurcation, the genital aperture lies somewhat anterior to the bifurcation of the gut, a cirrus sac is absent and the intestinal caeca end well in front of the acetabulum. In addition both occur in the intestine of freshwater fish. Since the resemblance to *Kalitrema* is so marked, it is proposed to assign the genus *Brevicaecum* to the subfamily Kalitrematinae Travassos, 1933.

It must be admitted that some doubt as to the correctness of this decision remains. *Kalitrema* exhibits a number of very characteristic features not shared by *Brevicaecum*, principally the presence in the former of a curious structure, a ring-like projection near the anterior end of the body; the presence of a genital sucker; the absence of an oesophageal bulb, and the presence at the posterior end of the body of two semi-circular lobes between which the acetabulum is situated. Only two specimens of *Kalitrema* were available to Travassos and apparently no sections were cut. This is particularly unfortunate since the examination of sections would probably have revealed the structure of the excretory system. The future determination of the form of the excretory system in *Kalitrema* will probably decide whether the inclusion of *Brevicaecum* in the subfamily Kalitrematinae is justified or not.

It is worth noting that the difference in geographical distribution is probably not significant. Such a wide distribution is known even within a single genus. (*Schizamphistomoides*, *Helostomatis*).

(REDESCRIPTION)

Paramphistomatidae

Brevicaecum niloticum McClelland, 1957

Thirty specimens of this species were collected by the writer from the intestine of fifteen fishes, *Citharinus citharus* (Geoffroy) in Khartoum area in the Sudan. It is interesting to note that every fish examined was found to be infected, that every fish harboured only two worms, more or less of the same size, very close to each other and in a definite position of the intestine. The larger the fish the larger the size of the worms found in it.

The present study is based on the examination of living material, stained whole mounts and series of sagittal and cross sections.

The worms are pinkish white in the living condition. The body is elongate oval in outline measuring 5·7–10 mm. in length, with a maximum width of 1·7–3·5 mm. attained at the level of the intestinal bifurcation. In cross section the body is circular. When fixed the body tends to curve slightly on the ventral side. The body is entirely without cuticular spines.

The acetabulum is terminal in position at the posterior end of the body but in pressed specimens it takes a ventral position. It is rounded or oval in outline measuring 1·2–1·6 × 1·0–1·5 mm., and its aperture is round or oval.

The mouth is anterior and terminal leading to a large muscular pharynx with a pair of large primary pharyngeal sacs directed postero-dorsally. The pharyngeal sacs are slightly smaller than the pharynx measuring 0·52–0·76 mm. deep. A short oesophagus, measuring 0·43–0·79 mm. in length, emerges on the ventral side from the point of union between the pharynx and the pharyngeal sacs. The oesophagus terminates in a large, muscular, thick walled oesophageal bulb measuring 0·33–0·53 mm. in length. The intestinal bifurcation follows immediately giving rise to moderately wide caeca which extend posteriorly to a short distance posterior to the mid-length of the body.

The testes are situated ventrally at the level of the intestinal bifurcation, overlapping the caeca, and only in very much pressed specimens are they displaced and lie slightly lateral to the caeca. They are oval or slightly rounded in outline measuring 0·23–0·4 × 0·33–0·5 mm. with entire margins. There is no cirrus sac or seminal vesicle and the genital aperture is median lying at the level of the posterior end of the pharyngeal sacs.

The spherical ovary measures 0·5–0·8 mm. in diameter and lies a short distance posterior to the posterior end of the intestinal caeca, more or less in the median line. No receptaculum seminis is present and Laurer's canal opens on the dorsal side of the body at the level of the posterior end of the ovary. The vitelline follicles are lateral, lying in two compact patches on each side of the body, ventral and internal to the caeca, beginning at the level of the posterior end of the caeca or slightly anterior to it and terminating at the level of the ovary. A small vitelline reservoir is seen in sections to lie on the dorsal side at the level of the ovary. The uterus is almost entirely pre-ovarian extending only a short distance posterior to the ovary. Its coils which are intercaecal are packed with eggs. The eggs are oval measuring 0·11–0·13 × 0·6–0·7 mm.

The excretory vesicle is Y-shaped with its median limb comparatively short while the lateral limbs are long extending anteriorly to the level of the pharynx. The two lateral canals take a spiral course round the caeca and unite together a short distance posterior to the ovary to form the short median vesicle which opens on the dorsal surface of the body at the level of the anterior border of the acetabulum, posterior to the opening of Laurer's canal. The contents of the excretory vesicle are black in colour. A lymph system is present.

Discussion

A detailed description of *Brevicaecum niloticum* has been presented in order to amplify the description given by McClelland (1957) and to point out several differences.

When McClelland described this species the material available was meagre consisting of whole mounts and series of incomplete and oblique sections of Dr. Woodland's collection, collected from the Sudan between 1913 and 1918. Through the kindness of Mr. Prudhoe of the British Museum (Natural History), the writer examined this collection. It was obvious that the material was very much pressed and consequently the position and size of certain organs were distorted.

McClelland described the body as dorso-ventrally flattened, but examination of living material as well as cross sections (Fig. 3) shows that the body is rounded. The acetabulum was described as ventral, but it is obvious from the sagittal section (Fig. 2) that the acetabulum is terminal.

I failed to find the receptaculum seminis described by McClelland either in my collection or in the original material, but I found a small vitelline reservoir in the same position which was probably mistaken by McClelland for the receptaculum seminis. Moreover, this structure is rarely met with in the family Paramphistomidae.

The position of the testes was stated to be normally lateral to the intestinal caeca, but sometimes to overlap these structures. It is evident that this is incorrect, the stated position being due to distortion of the worm during fixation and pressing; the study of non-pressed material and cross sections (Fig. 3) reveals that the testes overlap the caeca. This pressure would also account for the larger size and lobed margins of the testes given by McClelland.

McClelland stated "The excretory system consists of four longitudinal canals, one dorsal and one ventral to each intestinal caecum. . . . It appears that the two excretory vessels on each side of the body are not always clearly distinguishable, particularly posterior to the termination of the intestinal caeca, suggesting that anastomoses may occur, but it was not possible to establish this fact by study of sectioned material available." There are two lateral excretory vessels only (Fig. 1) which take a spiral course round the caeca.

From the above differences it is felt necessary to amend the characters of the genus *Brevicaecum*.

From Khalil (1963)

Brevicaecum niloticum McClelland, 1957

Host: *Citharinus citharus* (Geoffrey St. Hilaire) (Citharinidae).
Location: Small intestine.

Locality: Volta River near Yeji, Ghana.

Dates: 16-18 August 1963.

Specimens deposited: USNM Helm. Coll. No. 71651.

Discussion: This species was first described by McClelland (1957) and redescribed by Khalil (1963) from the same host species as noted above from the Nile in Sudan. Our collection consists of nine specimens.

From Fischthal and Thomas, 1972

BREVICAECUM

LOOSE LEAF
ORGANIZER

SCHEDULE

PERIOD OR TIME								
COURSE **MON.** INSTRUCTOR								
COURSE **TUE.** INSTRUCTOR								
COURSE **WED.** INSTRUCTOR								
COURSE **THU.** INSTRUCTOR								
COURSE **FRI.** INSTRUCTOR								
COURSE **SAT.** INSTRUCTOR								

NAME _____

ADDRESS _____

SCHOOL _____ TELEPHONE _____

Genus : *Caballeroia* Thapar, 1960.*

Generic diagnosis : Body cylindrical. Anterior end bears small conical papillae, arranged in five distinct rows. Oral diverticles long. Pharynx absent. Oesophagus long. Caeca wide, sinuous, terminating in region of acetabulum. Testes slightly lobed, oval, preequatorial, situated slightly obliquely one behind other, touching and slightly overlapping each other in middle line, mainly intercaecal, broader than long. Ovary small, reniform, sinistral in position at posterior end in front of acetabulum. Genital pore ventral in position slightly on right side of median line, just in front of intestinal bifurcation. Vitellaria consist of large number of distinct rounded or oval follicles on each side, extending from anterior end of acetabulum to middle of body at posterior extremities of testes, mainly caecal in position. Uterus occupying entire space between intestinal caeca behind testes and extending slightly at places into caecal region and acetabulum, it runs forwards forming few coils in front of testes. Parasites of fishes.

* Prof. Thapar has neither put it in any subfamily nor has given any generic diagnosis. Present authors kept this genus seperately for the present.

Type species : *C. indica* Thaper, 1960.

Mukherjee and Chauhan, 1965

The present contribution deals with the description of a new amphistome received from one of my former students, Mr. M. J. Mathew, Research Assistant in T. B. Project, Hospet (Madras), collected from the intestine of a fish, *Cirrhina fulungel*, at Tungabhadra Dam. It is proposed to dedicate this trematode to honour the great Mexican helminthologist, Dr. Eduardo Caballero y Caballero, for his remarkable contributions in the field of helminthology.

Caballeroia indica n. g., n. sp. Thapar, 1960

The trematode is cylindrical and is rounded at either end, but the posterior end is broader than the anterior. It measures 4.6 mm in length with the maximum breadth of 2.0 mm which is towards the posterior end, just in front of the acetabulum. The anterior end bears small conical papillae over the body arranged in five distinct rows, the rest of the body being smooth and devoid of such structures. The mouth is slightly subventral in position at the anterior end and is surrounded by an oral sucker, 0.25 mm in diameter. At the posterior extremity is a large spherical acetabulum (posterior sucker), about 1.0 mm in diameter. The excretory pore is dorsally situated just in front of the acetabulum and is 1.0 mm from the posterior end. The genital pore is ventral in possition, slightly on the right side of the median line at a distance of 0.9 mm from the anterior end, just in front of the intestinal bifurcation.

The mouth leads into an elongated oesophagus, which bears a pair of long oral diverticula anteriorly, 0.28 mm long. There is no pharynx and the oesophagus divides posteriorly into two wide sinuous intestinal caeca, extending backward to the posterior end and terminating blindly into broad ends in the region of the acetabulum.

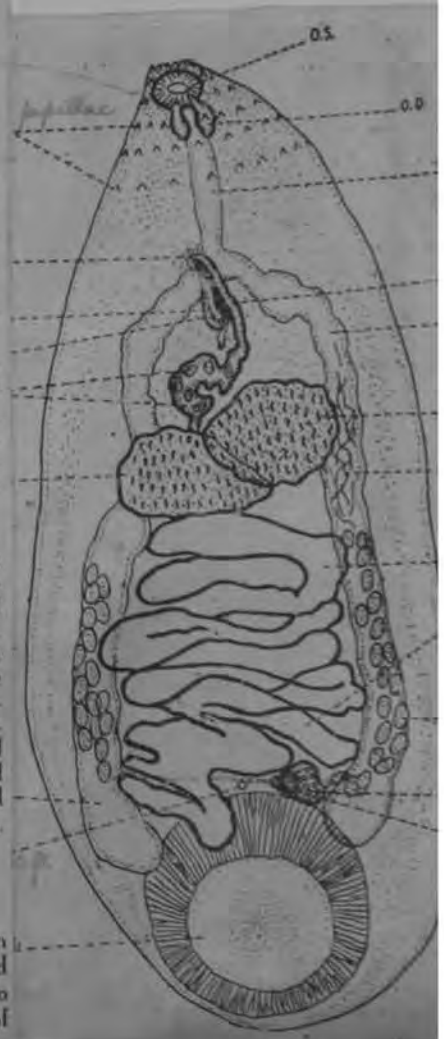
The excretory pore, as already stated above, is situated dorsally in front of the acetabulum. It leads into a pair of lateral excretory ducts. These ducts give off branches that surround the intestinal caeca, forming a network or plexus round them in the same way as described by Thapar and Sinha (1945) for *Olveria indica*.

The lymphatic canals were not visible.

The ovary is a small, reniform structure, having a slight notch on the left side, and is sinistral in position at the posterior end. It is situated dorsally and in front of the acetabulum and measures about 0.23 mm by 0.22 mm. The oviduct arises as a small narrow duct from its left side and runs ventrally backward to the right side and after a short course meets the ducts from the vitelline glands at the ootype, mostly ventral to the ovary. It is surrounded by a large number of small unicellular shell glands. The vitellaria consist of a large number of distinct rounded or oval follicles on each side, extending from the anterior end of the acetabulum to the middle of the body at the posterior extremities of the testes. They are mainly caecal in position, being situated on the ventral side of the intestinal caeca.

The uterus is an extensive structure occupying the entire space between the intestinal caeca behind the testes and extending slightly at places into the caecal area and the acetabulum. It runs forwards as a narrow tube, forming a few coils in front of the testes, between the intestinal caeca. It then runs as a narrow convoluted tube to open at the genital pore, a little in front of the intestinal bifurcation on the right side of the oesophagus. The uterus is full of eggs. The eggs are small oval structures, measuring 0.08 mm by 0.05 mm.

There are two oval, slightly lobed testes, pre-equatorial in position and situated slightly obliquely, one behind the other, touching and slightly overlapping each other in the middle line. They are mainly intercaecal in position and are broader than long. The right testis overlaps slightly the caecum of that side and is larger than the left. It measures 0.7 mm in breadth and 0.45 mm in length. The left testis is slightly smaller than the right and measures 0.65 mm in breadth and 0.5 mm in length. The vasa efferentia were not visible, but in front of the testes there is a narrow duct, slightly loop-shaped, representing a vesicula seminalis externa, just behind the cirrus sac. The cirrus sac is an elongated pear-shaped structure that runs parallel to the female duct. It is thin-walled and contains a small coiled vesicula seminalis interna, which leads into an elongated cylindrical cirrus. It opens at the genital pore at the side of the female genital pore, to the right of the oesophagus, just in front of the intestinal bifurcation. The cirrus sac is 0.32 mm long.



DISCUSSION

The present form, *Caballeroia*, shows general resemblance to several known genera of amphistomes, like *Neocladorchis*, *Helostomatis*, *Protocladorchis*, and *Orientodiscus*. The characters common to it and these genera mainly relate to the shape of the body, presence of the oral diverticula, post-testicular position of the ovary and the position of the uterine coils. However, on closer examination, it can be easily distinguished from all of them. Thus, from *Neocladorchis*, it can

be distinguished by the absence of a pharynx, the relative position of the testes, position of the vitellaria, and the presence of a vesicula seminalis externa, and the position of the genital pore. *Helostomatis* resembles the present form in the general shape of the body, possession of oral diverticula, position of the testes, and the position of the genital pore, but differs from it in the presence of a pharynx, extracaecal position of the vitellaria and the presence of a genital sucker. The testes in *Helostomatis*, though connubial, are separated from each other by the uterine coils. In *Protocladorchis*, the testes are tandem an equatorial in position, vitellaria are extracaecal in position, extending from acetabulum to intestinal bifurcation, and genital sucker is present, and thus it can be easily separated from *Caballeroia*. *Orientodiscus*, although possessing oral diverticula, has also a pharynx, has gland cells surrounding the oesophagus, has tandem testes and extensive extracaecal vitellaria and is thus separated from the present form. The present form is peculiar in lacking a pharynx, in having diagonal testes touching each other in the middle, ovary sinistral in position, caecal position of vitellaria mainly behind the testes, the presence of a vesicula seminalis externa, and absence of a genital sucker. All these points indicate that the present form cannot be placed under any of the known genera. A new genus, *Caballeroia*, is therefore created to include it. A table of comparative characters in given to indicate differentiation of some genera in fishes.

Type species: *Caballeroia indica*.

Host: *Cirrhina fulungee*. Cyprinid.

TABLE 1

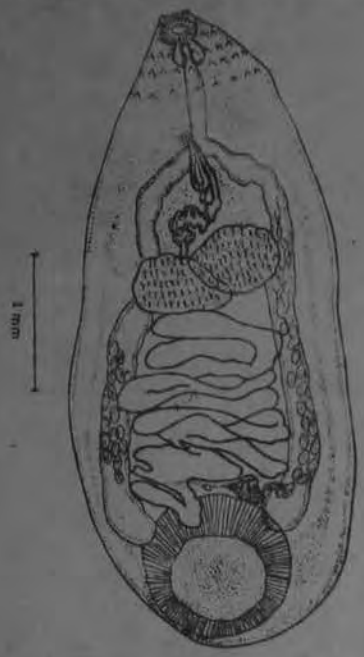
CHARACTERS OF DIFFERENTIATION BETWEEN SOME OF THE GENERA OF AMPHISTOMES FROM FISHES

Amphistome genus	Body	Oral sucker	Pharynx	Genital pore	Cirrus pouch	Testes	Ovary	Vitellaria	Uterus	Host
Chiorchis	Pearshaped	Oral diverticula present	Present	Genital sucker present	Present	Tandem	Post testicular Posterior	Extracaecal	Precaecal	Trachichthys Moretius
Diadyptoema	Elongated	Oral diverticula present	Present	Genital sucker absent Postfurcal	Present	Tandem mid-body	Post testicular Posterior	Intracaecal, post equatorial	Pre- and post-ovarial	Salmo sp. and other fishes
Helostomatis	Elliptical	Oral diverticula present	Present	Genital sucker present Prefurcal	Present	Connubial pre-equatorial	Near posterior sucker	Extracaecal	Precaecal, intercaecal	Labeo calbasu
Microrchis	Elongated cylindrical	Oral diverticula fused with oral sucker	Present	Genital sucker absent Intercaecal	Present	Tandem	Equatorial	Caecal midbody	Pre- and post-ovarial, intercaecal	Silurus palmitus Salmo gairdneri
Neocladorchis	Subcylindrical	Oral diverticula present	Present	Genital sucker absent At int bifurcation	Present	Tandem pre-equatorial	Central, posterior	Extracaecal and caecal	Precaecal	Barbus dukanensis
Nicollodiscus	Conical	Oral diverticula present	Present	Large genital sucker. Prefurcal	Present	Extracaecal midbody	Near posterior sucker	Extracaecal, horseshoe shaped	Precaecal	Silurodia gangetica
Orientodiscus	Funiform	Oral diverticula present	Present	Intercaecal	Present	Tandem, intercaecal	In front of acetabulum	Extracaecal	Precaecal	Silurodia gangetica
Protocladorchis	Elongated	Oral diverticula present	Present	Genital sucker present Prefurcal	Present	Tandem	Near posterior sucker	Extracaecal	Irregular, intercaecal	Pangasius pangasius
Caballeroia	Cylindrical	Oral diverticula present	Absent	Genital sucker absent Prefurcal	Vesicula seminalis int & ext present	Diagonal touching each other	Sinistral, ventrum, pre-acetabular	Caecal, post-testicular	Intercaecal, pre-ovarial	Cirrhina fulungee

1960
Ref. Cab. Jubilee Vol.
p. 315-320.

Caballeroia indica Thaper, 1960.

Specific diagonosis : Body cylindrical, rounded at both ends, posterior end broader than anterior, measures 4.6 mm. long, 2.0 mm. broad. Anterior end bears small conical papillae arranged in five distinct rows, rest of body smooth. Oral sucker 0.25 mm. in diameter. Acetabulum measures 1.0 mm. in diameter. Excretory pore situated just in front of acetabulum. Mouth leads into an elongated oesophagus with a pair of long oral diverticula anteriorly. 0.28 mm. long. Pharynx absent. Caeca sinuous, extending backward to posterior end, terminating blindly into broad ends in region of acetabulum.



Text-fig. 6. *Caballeroia indica* Thapar, 1960. (After Thapar, 1960).

Testes slightly lobed, oval, precquatorial in position, situated slightly obliquely one behind other, touching and slightly overlaping each other in middle line, mainly intercaecal, broader than long. Right testis larger than left, 0.45 mm. long, 0.7 mm. broad. Left testis 0.5 mm. long, 0.65 mm. broad. Cirrus sac elongated, pear-shaped, parallel to female duct, contains small coiled vesicula seminalis interna. Cirrus sac 0.32 mm. long. Ovary small, reniform, sinistral in position at posterior end, situated in front of acetabulum, measures 0.25 mm. x 0.22 mm. Vitellaria consist of a large number of distinct rounded or oval follicles on each side, extending from anterior end of acetabulum to middle

of body at posterior extremities of testes, mainly caecal in position. Uterus extensive, occupying entire space between intestinal caeca behind testes, extending slightly at places into caecal region and acetabulum, runs forward as a narrow tube forming a few coils in front of testes between caeca. Genital pore ventral, slightly on right side of median line, in front of intestinal bifurcation. Eggs small measuring 0.08 x 0.05 mm.

Host : *Cirrhina fulungee*

Location : Intestine.

Distribution : Tungabhadra Dam, Hospet (Mysore State).

CABALLERO IA

Cleptodiscinae Skrjabin, 1949

Subfamily diagnosis. — Body elongate, somewhat fusiform. Acetabulum not very large, ventroterminal. Oral diverticles small. Esophageal bulb absent. Testes tandem, in midregion of body. Cirrus pouch present. Genital pore bifurcal, surrounded by muscular disc. Ovary between two cecal ends. Vitellaria along posterior portion of ceca in testiculo-ovarian zone. Excretory arms united anteriorly. Parasites of fishes.

Subfamily : CLEPTODISCINAE Skrjabin, 1949.

Subfamily diagnosis : Body elongate. Acetabulum small. Oral diverticula small. Oesophageal bulb present or absent. Testes tandem, at middle region of body. Genital pore bifurcal, surrounded by muscular dics. Ovary posteriorly near caecal terminations, intracaecal. Vitellaria restricted to posterior portion of caeca in testiculo-overian zone.

Mukherjee and Chauhan, 1965

Cleptodiscus Linton, 1910

Syn. *Neocladorchis* Bhalerao, 1937

Generic diagnosis. — Paramphistomidae, Cleptodiscinae: Body smooth, elongate, somewhat fusiform, with blunt-pointed or rounded extremities. Acetabulum not very large, ventroterminal. Mouth terminal. Oral diverticles small. Esophagus slender, without bulb. Ceca simple, reaching to near posterior extremity, often inflated posteriorly. Testes a little obliquely tandem, close together in midregion of body. Vesicula seminalis tubular, narrow, convoluted. Cirrus pouch present. Genital pore at intestinal bifurcation, surrounded by muscular disc. Ovary median or submedian, between two cecal ends, with shell gland immediately behind. Vitellaria along posterior portion of intestine. Uterus intercecal; eggs relatively large. Excretory vesicle small, with dorsal aperture; arms uniting dorsal to anterior part of esophagus. Parasites of marine and freshwater fishes.

Genotype: *C. reticulatus* Linton, 1910 (Pl. 30, Fig. 386), in *Pomacanthus arcuatus*, *P. aureus*; Florida.

Other species: *C. poonaensis* (Bhalerao, 1937), syn. *Neocladorchis p.* B., in *Barbus dobsoni*; India. *C. bulbosus* Hanson, 1955, in *Melichthys buniva*; Honolulu.

Paramphistomidae

CLEPTODISCUS Linton, 1910

Diagnosis from Travassos, 1934:

Cladorchinae. Body elongated. Acetabulum large, terminal. Oral sucker with diverticula. Esophagus without pharynx. Ceca long, sublinear, dilated at distal extremity and scarcely reaching to the acetabular zone. Genital pore without sucker median, bifurcal. Cirrus sac present. Testes equatorial with fields coinciding and zones in contact. Ovary ~~pre~~post testicular and located above the acetabular zone. Uterus precovarian, dorsal, beyond the testes. Vitellaria postequatorial, lateral, cecal and slightly intracecal, from the zone of the posterior testis to the end of the cecal zone.

Habitat: intestine of fish.

Type species: Cleptodiscus reticulatus Linton, 1910

Other species: C. poonaensis (Bhalerao, 1937) Yamaguti, 1953

C. bulbosus Hanson, 1955

C. hyphosi Sogandares

Syn: Neocladorchis

✓ Tortugas

17. Cleptodiscus reticulatus Linton, 1910

Fig. 2

Host: *Pomacanthus aureus* (Bloch), black angelfish; in 6 of 14 hosts examined. Since this host is listed as *P. arcuatus* in my records (see footnote on p. 263), it is probably the same species reported by Linton.

Location: Intestine.

Discussion: This trematode was not studied extensively and only a few details can be added to Linton's description. Traces of pigment eye-spots

are evident. The posterior half of the esophagus is provided with circular muscles as well as gland cells. The excretory tubes end blindly just posterior to the oral sucker and do not unite. There is one pair of large lymphatic vessels unbranched and somewhat sinuous in the middle region of the body, becoming much swollen and conspicuous opposite the two suckers. No other lymphatic vessel could be seen either from toto-mounts or cross-sections. The two vessels unite dorsal to the oral sucker near the anterior end of the body but end blindly posteriorly on each side of the acetabulum. The acetabulum contains vesicular pockets of lymph.

Cleptodiscus was tentatively classified in the subfamily Schizamphistominae by Näsmark (1937).

From same host at Bimini (Sogandares, 1959)

Also in Puerto Rico (Stirling and Cable, 1968)

FAMILY PARAMPHISTOMATIDAE FISHOEDER, 1901

Cleptodiscus reticulatus Linton, 1910

Host: *Pomacanthus arcuatus*.
Site: large intestine.
Locality: Guaniquilla, P. R.
Eight amphistomes from one host are tentatively identified as the above species. As in many of our microscaphiids, the worms shrivelled badly when cleared, yielding preparations too poor for critical study and description.

from Siddiqi + Cable, 1960

FAMILY PARAMPHISTOMATIDAE
Fischoeder, 1901

Cleptodiscus reticulatus Linton, 1910

Host: *Pomacanthus arcuatus* (2 of 4).
Site: Rectum. Overstreet, 1969

The genus *Cleptodiscus* was named by Linton (1910). Yamaguti (1953) considered *Neocladorchis* Bhalerao, 1937 a synonym of *Cleptodiscus*. The following generic diagnosis is modified from Yamaguti (1953):

Cleptodiscus.

Paramphistomatidae. Body elongate, somewhat fusiform, blunt-pointed or rounded ends, with or without papillae anteriorly. Acetabulum ventroterminal, medium-sized. Mouth terminal. Pharyngeal diverticles in form of small suckers. Esophagus slender, with or without terminal bulb. Ceca simple, reaching to near posterior end of body. Testes obliquely tandem to diagonal in midregion of body. Seminal vesicle tubular, narrow, convoluted. Cirrus sac present. Genital pore at intestinal bifurcation, with or without muscular margin. Ovary median or submedian, between cecal ends, with shell gland immediately behind. Vitellaria along posterior portion of intestine. Uterus intercecal; eggs numerous. Excretory vesicle small, with dorsal aperture, excretory tubes extending to level of esophagus where they may unite. Parasites of marine and freshwater fishes.

GENOTYPE: *C. reticulatus* Linton, 1910 in *Pomacanthus arcuatus;* Florida.

Other species: *C. poonaensis* (Bhalerao, 1937) Yamaguti, 1953 from *Barbus dodsoni;* India. *C. bulbosus* from *Melichthys buniva;* Hawaii.

COMPARISONS: *C bulbosus* resembles *C. poonaensis* in its esophageal bulb and cuticular papillae. It differs in possessing a larger pharynx, smaller pharyngeal diverticles, a larger esophageal bulb, smaller and more separated testes, a bipartite cirrus sac, a muscular margin to the genital pore, a single pair of lymphatic vessels, a more anterior extent of the uterus, and eggs which, although nearly the same length, are twice as wide. *C. bulbosus* resembles *C. reticulatus* in the size of the diverticles, the muscular margin of the genital pore, the anterior extent of the uterus, and the single pair of lymphatic vessels; but differs in the presence of the esophageal bulb (although Manter (1947) reported circular muscles in the posterior half of the esophagus of *C. reticulatus*), the presence of cuticular papillae, the character of the pharynx, smaller and more separated testes, and smaller eggs. Linton (1910) reported that the excretory tubules of *C. reticulatus* joined dorsal to the esophagus, but Manter (1947) observed that the tubules ended blindly near the pharynx. The tubules of this single specimen of *C. bulbosus* join dorsal to the esophagus.

From Hanson, 1955.

Cleptodiscus

Paramphistomatidae India

Syn Neocladorchis Bhalerao, 1937

Body subcylindrical. Posterior sucker terminal. Oral sucker with fairly large diverticula. Intestinal caeca terminating close in front of posterior sucker or partially overlapping it. Esophagus with a bulb. Genital pore central, bifurcal. Genital sucker absent. Testes oblique, lobed, for the most part pre-equatorial, touching or partially overlapping each other. Cirrus sac present. Ovary central, closely anterior to posterior sucker. Laurer's canal present. Uterus pre-ovarian. Vitellaria post-equatorial, lateral, extra-caecal and caecal, extending between posterior testis and posterior sucker. Lymphatic canals three on each side.

Type species: Neocladorchis poonaensis Bhalerao, 1937

Synonym of Cleptodiscus

Host: Barbus dobsoni India

(in Poona, India a cyprinid fish (freshwater)

-OVER-

-OVER-

CLEPTODISCUS

BHALERAO, 1937

Diagnosis of *Neocladorchis* n.g.:—Cladorchinæ : Body subcylindrical. Posterior sucker terminal. Oral sucker with fairly large diverticula. Intestinal cæca terminating close in front of posterior sucker or partially overlapping it. Œsophagus with a bulb. Genital pore central, bifurcal. Genital sucker absent. Testes oblique, lobed, for the most part pre-equatorial, touching or partially overlapping each other. Cirrus sac present. Ovary central, closely anterior to posterior sucker. Laurer's canal present. Uterus pre-ovarian. Vitellaria post-equatorial, lateral, extra-cæcal and cæcal, extending between posterior testis and posterior sucker. Lymphatic canals three on each side.

Type species.—*Neocladorchis poonaensis* Bhalerao, 1937.

The form described here is closely related to the genera *Schizamphistomoides* Stunkard, 1925 and *Ophioxenos* Sumwalt, 1936, but it cannot be adequately fitted in any of these two genera. From the former it differs in having larger oral diverticula, in the testes being either touching or partially overlapping each other and the posterior extent of the intestinal cæca. From the latter it differs in respect of the size of the oral diverticula, the posterior extent of the intestinal cæca, the relative position of the two testes, the size of the vitelline follicles, the position of the ovary and the posterior extent of the uterus. For these reasons it is considered necessary to create a new genus for its reception for which the name *Neocladorchis* is proposed.

Genus : *Neocladorchis* Bhalerao, 1937

Generic diagnosis : Body smooth, subcylindrical. Acetabulum ventroterminal, oral diverticles fairly large. Oesophageal bulb present. Caeca simple, long. Testes lobed a little obliquely tandem, preequatorial, touching or partially overlapping each other. Genital pore bifureal, genital sucker absent. Cirrus sac present. Ovary intracaecal, near termination of caeca. Vitellaria postequatorial, lateral, extracaecal. Uterus intracaecal, preovarian.

Type species : *N. poonaensis* Bhalerao, 1937.

Mukherjee and Chauhan, 1965

CLEPTODISCUS

Neocladorchis n.g. Bhalerao, 1937

SYN *Neocladorchis poonaensis* n.g., n. sp. (Fig. 12).

The material proposed to be described here was collected in 1933 by Professor J. N. Karve from the intestine and rectum of *Barbus dobsoni* in Poona.

CYPRINID FISH

The worms are subcylindrical and measure 1·8–5·85 × 0·6–1·4 mm. The broadest portion of the worm is immediately in front of the posterior sucker. The most anterior part of the body is sharply attenuated and appears to be somewhat distinct from the rest of the body. It is covered with small papillæ which in some cases are more prominent than others. The cuticle of the rest of the body is devoid of any armature.

The mouth is terminal and is surrounded by the oral sucker measuring 0·22–0·33 × 0·24–0·38 mm. This latter has two diverticula at its postero-lateral aspect, measuring 0·225–0·3 × 0·185–0·235 mm. These are oval and are together broader than the width of the oral sucker. The posterior sucker measures 0·63–1·07 mm. in diameter. The œsophagus is 0·36–0·68 mm. long and 0·125–0·175 mm. wide. Posteriorly it has a muscular bulb measuring 0·165–0·22 × 0·135–0·215. The œsophagus as well as the bulb are covered with glands. The intestinal cæca are somewhat sinuous and pass posteriorly as far as the anterior border of the posterior sucker. They may, in some cases, partially overlap the posterior sucker or might terminate slightly anterior to it.

The excretory bladder is oval and lies dorsal to the posterior sucker. The excretory pore is situated on the dorsal side slightly behind the middle of the posterior sucker. There are three lymphatic canals on each side of the body.

The testes are lobed and measure 0·36–0·825 × 0·28–0·67 mm. They are situated almost pre-equatorially and lie slightly oblique to each other. The horizontal zones of the testes may be touching or partially overlapping each other. The vesicula seminalis externa is much coiled and occasionally swollen at places. The cirrus sac is small, and measures 0·285–0·33 × 0·17–0·18 mm. The vesicula seminalis interna lying at the base of the cirrus sac is also coiled. The distal portion of the male genital duct, the pars prostatica, is a thin, straight duct. The cirrus sac opens into the genital atrium which communicates to the exterior by means of the genital pore. This latter is situated on the ventral side, in the region of the intestinal fork.

The ovary is round and measures 0·13–0·28 mm. in diameter. It is situated centrally, slightly in front of the posterior sucker. The shell gland is situated immediately posterior to the ovary, between the latter and the posterior sucker. The Laurer's canal is present. The uterus in the immature specimens is a zigzag tube passing centrally on the dorsal aspect. In the adult specimens the uterine coils fill up all the inter-cæcal area between the ovary and the posterior testis. Anteriorly the coils pass dorsally to the testes. The muscular terminal portion of the uterus opens into the genital atrium, posteriorly to the opening of the cirrus sac. The vitellaria are extra-cæcal and partially cæcal. They extend from some distance behind the posterior testis to the extremities of the intestinal cæca. The eggs measure 0·15–0·17 × 0·056–0·060 mm.

-OVER-

BHALERAO, 1937

Specific diagnosis of *Neocladorchis poonaensis* n. g., n. sp.—Anterior end covered with papillæ. Length 1·8–5·85 mm. Breadth 0·6–1·4 mm. Oral sucker 0·22–0·33 × 0·24–0·38 mm. Oral diverticula 0·225–0·3 × 0·185–0·235 mm. Posterior sucker 0·63–1·07 mm. in diameter. Œsophagus 0·36–0·68 mm. long. Testes 0·36–0·825 × 0·28–0·67 mm. Cirrus sac 0·285–0·33 × 0·17–0·18 mm. Ovary 0·13–0·26 mm. in dia. Ova 0·15–0·17 × 0·056–0·060 mm.

Host.—*Barbus dobsoni*. Cyprinid fish

Location.—Intestine.

Locality.—Poona (Bombay Presidency).

All the type and cotype material of the species dealt with in this communication is to be deposited in the Helminthological Collection of the Imperial Veterinary Research Institute, Muktesar.

The genus *Neocladorchis* created by Bhalerao, 1937 and was placed under the subfamily Schizamphistomatinae Looss, 1912 by Skrjabin, 1949. Further he included this subfamily under a new family and superfamily Diplodiscidae and Cladorchoidea respectively. Yamaguti, 1958, however, considered this genus as synonym to *Cleptodiscus* Linton, 1910.

Text-fig. 2. *Neocladorchis poonaensis* Bhalerao, 1937. (After Bhalerao, 1937).

Neocladorchis poonaensis Bhalerao, 1937.

Specific diagnosis : Anterior end covered with papillae. Length 1.8-5.85 mm. Breadth 0.6-1.4 mm. Oral sucker 0.22-0.33 x 0.24-0.38 mm. Oral diverticula 0.225-0.3 x 0.185-0.235 mm. Posterior sucker 0.63-1.07 mm. in diameter. Oesophagus 0.36-0.68 mm. long with posterior muscular bulb, measuring 0.165-0.22 x 0.135-0.215 mm., oesophagus and bulb covered with glands. Testes 0.36-0.825 x 0.28-0.67 mm. Cirrus sac 0.285-0.33 x 0.17-0.18 mm. Ovary 0.13-0.26 mm. in diameter. Eggs measure 0.15-0.17 x 0.056-0.060 mm.

Host : *Barbus dobsoni*.

Location : Intestine.

Distribution : Poona.

FROM: MUKHERJEE & CHAUHAN 1965

Hawaii

PARAMPHISTOMATIDAE

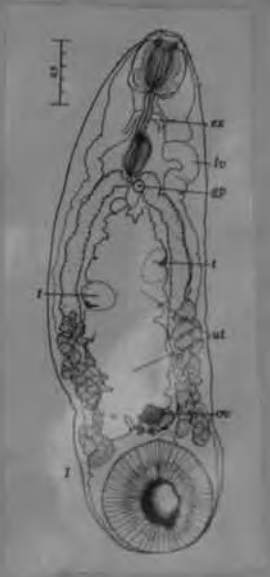
Cleptodiscus bulbosus n. sp. (Fig. 1) Hanson, 1955

HOST: *Melichthys buniva* (Lacépède), trigger fish; "humu-humu ele-ele"; in 1 of 6 specimens examined.

LOCATION: Intestine

TYPE SPECIMEN: U. S. Nat. Mus. Helm. Coll. No. 37461.

DESCRIPTION (based on a single specimen): Body fusiform, tapering anteriorly and rounded posteriorly with slight indentation at level of ovary; 3.91 mm. long and 1.23 mm. wide at midbody; minute papillae around mouth opening and widely scattered about pharyngeal level of body surface. Acetabulum ventroterminal, round, with rounded opening; 0.840 mm. long by 0.847 mm. wide. Mouth opening at anterior end of body, leading into shallow prepharyngeal atrium; sphincter-like ring of circular muscles guard anterior entrance into large pharynx; pharynx 0.438 mm. long by 0.431 mm. wide, consisting of a central muscular core with prominent longitudinal muscles, a middle glandular layer, and an outer covering at base of which are a pair of rudimentary, sucker-like diverticles. Slender esophagus 0.358 mm. long, entering large esophageal bulb before bifurcating; esophageal bulb 0.307 mm. long by 0.146 mm. wide, consisting of both longitudinal and circular muscles. Both esophagus and esophageal bulb surrounded by glandular cells. Ceca simple, extending to level of ovary, with slightly undulating outer walls. Genital pore median, relatively large, immediately ventral to cecal bifurcation; muscles and gland cells surrounding pore. Testes diagonal; right testis at midbody, 0.219 mm. long by 0.270 mm. wide; left anterior testis with lateral indentation, 0.241 mm. long by 0.212 mm. wide; testes separated by width of one testis. Cirrus sac bipartite consisting of rounded posterior portion and a more oval terminal section; seminal vesicle tubular, much coiled in rounded portion of cirrus sac, less coiled in oval portion; cirrus small. Ovary ovoid, median, between ends of ceca, near acetabulum; 0.212 mm. long by 0.263 mm. wide. Uterus concealing anterior half of ovary, extending posterior to ovary on right side of body but not reaching acetabulum, then filling most of intercecal space; terminating in short glandular metraterm. Mehlis' gland dorsal, partially posterior and partially to left of ovary. Vitelline follicles large, irregular in shape, extending from near posterior level of posterior testis to near acetabulum, lateral and ventral to ceca and continuing beyond cecal ends; small vitelline



reservoir located just posterior to ovary. Eggs small, oval, very numerous; 43 to 61μ by 31 to 37μ, usually 54 to 56μ by 34 to 37μ. Details of excretory system could not be traced, but excretory tubes join dorsal to esophagus midway between pharynx and esophageal bulb. A pair of well-developed, unbranched, lymphatic vessels lie lateral to ceca and extend full length of body, appearing swollen at both ends of body and somewhat sinuous anterior to cecal bifurcation.

Hawaii

314. *Cleptodiscus bulbosus* Hanson, 1955

(Fig. 314)

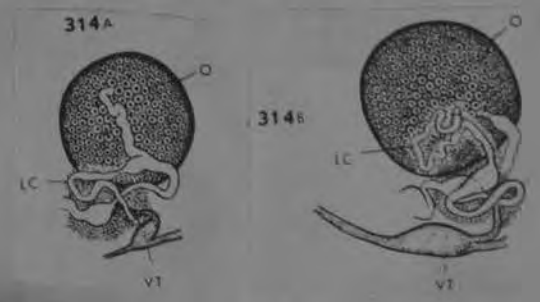
HABITAT: Intestine of *Melichthys vidua* and *Chaetodon miliaris* (both new hosts); Hawaii.

DESCRIPTION (based on 16 whole mounts): Body subcylindrical, plump, with rounded extremities, 2.8-5.3 × 0.75-2.1 mm. Acetabulum ventroterminal, with round opening, 0.5-1.0 mm in diameter. Mouth terminal, with minute pointed papillae around its opening. Oral sucker 0.25-0.43 × 0.22-0.55 mm, consisting mainly of meridional muscle fibers, provided posteriorly with a pair of rather inconspicuous diverticles. Esophagus provided with longitudinal and circular muscles, 0.18-0.4 mm long; esophageal bulb 0.13-0.36 mm long by 0.1-0.21 mm wide, with very thick inner longitudinal and outer circular muscles, followed by short esophagus proper lined with cuticle. Ceca wide, terminating at level of anterior end of ovary.

Testes oblique, medial to ceca at anterior part of middle third of body, may be somewhat indented, 0.12-0.43 × 0.1-0.4 mm. Vesicula seminalis tubular, convoluted and enclosed in a thin connective tissue capsule. Cirrus pouch oval, 0.075-0.3 mm in diameter, containing winding vesicula seminalis interna and cirrus. Genital pore comparatively large, with radial fibers, ventral to intestinal bifurcation.

Ovary ovoid, entire, 0.1-0.36 × 0.09-0.45 mm, to left of median line at anterior end of posterior third of body, with shell gland complex behind. Laurer's canal opening dorsal or posterior to ovary (Fig. 314 A & B). (This difference is, I believe, due to the different degrees of pressure applied on the cover glass at the time of fixation.) Uterus winding forward from behind ovary to genital pore, partly overlapping testes. Eggs elongate oval, thick-shelled, 51-72 × 34-43 μ in life. Vitellaria divided into several multilobulated acini on each side, extending along ceca from behind level of posterior testis to a little beyond cecal ends. Excretory vesicle anterodorsal to acetabulum, with pore middorsal to acetabulum; main collecting ducts forming two tandem loops on each side, terminating behind oral diverticle without uniting with each other. A pair of conspicuous lateral lymph vessels(?) extending from posterior extremity to near oral sucker, communicating with complex lymph spaces in esophageal region.

DISCUSSION. In general anatomy our specimens agree with Hanson's description of *Cleptodiscus bulbosus* Hanson, 1955 from *Melichthys buniva* of Hawaii. Hanson states that the excretory tubes are united dorsal to the esophagus, as in *C. reticulatus* (Linton, 1910), but from my own observation on living material I agree with Manter (1947) in that the main excretory ducts do not join dorsal to the esophagus.



Cleptodiscus kyphosi n. sp. Sogandares-Bernal, 1959
(Figs. 1 to 3)

Host: Kyphosus sectatrix (Linn.); bermuda chub; family Kyphosidae.
Incidence of infection: In 1 of 4 hosts.
Number: 14.
Location: Mid-intestine.
Locality: Bimini, British West Indies.
Holotype: U. S. National Museum Helminthological Collection Number 38571.

Diagnosis (measurements on 6 favorable specimens): Body elongate, cylindrical, with conspicuous cuticular rugations, 3.2 to 5.2 long by 0.817 to 0.912 wide. Acetabulum ventroterminal, 0.494 to 0.551 long by 0.513 to 0.665 wide. Buccal aperture at anterior end of body, terminal or subterminal. Prepharyngeal atrium present or not, depending upon contraction of specimen. Pharynx without an anterior band of circular muscles; with 2 lateral diverticula, from ¼ to ½ length of esophagus. Gland cells surrounding base of pharynx between diverticula. Esophagus thick-walled, connecting with a spherical esophageal bulb consisting of both longitudinal and circular muscle fibers; bulb 0.304 to 0.361 long by 0.475 to 0.513 wide. Gland cells surrounding esophagus and esophageal bulb. Ceca ending blindly at posterior ¾ body. Genital pore ventral and sinistral to mid-line at cecal bifurcation, surrounded by muscles and gland cells; followed by a shallow genital atrium with a central, muscular, genital papilla. Testes 2, spherical, a short distance posterior to cecal bifurcation, tandem and in contact with each other; anterior testis 0.361 to 0.475 long by 0.475 to 0.513 wide; posterior testis 0.380 to 0.532 long by 0.456 to 0.513 wide. Cirrus sac spherical, extending diagonally from genital pore to very near or in contact with anterior border of foretestis. External seminal vesicle located between anterior testis and cecal bifurcation, coiling 3 or 4 times, connecting with coiled internal seminal vesicle in posterior ⅓ of cirrus sac. Small prostatic vesicle present at junction of internal seminal vesicle and swelling of an ejaculatory duct which opens externally on genital papilla. Prostate gland cells surrounding all structures within cirrus sac.

Ovary spherical, on inner aspect of blind end of left cecum. Mehlis' complex slightly overlapping ovary dorsally on its posterior border. Uterus extending posterior to ovary for a short distance, between ovary and testes, ascending intercecally on right side of both testes, filling pretesticular area to cecal bifurcation; entering genital papilla and opening separately from ejaculatory duct. Large vitellaria irregular in shape, extending from level of ovary almost to posterior testis, extracecal and/or overlapping each cecum. Eggs near ovary 56 to 72 microns long by 32 to 35 microns wide, operculated, thick-shelled. Excretory pore dorsal to acetabulum. Excretory bladder median between acetabulum and ovary; collecting tubules one on each side of body, ending blindly at anterior level of esophageal bulb. Lymphatic vessels voluminous, forming a branched lymph sinus dorsal to acetabulum; extending one on each side of body to join dorsal to pharynx.

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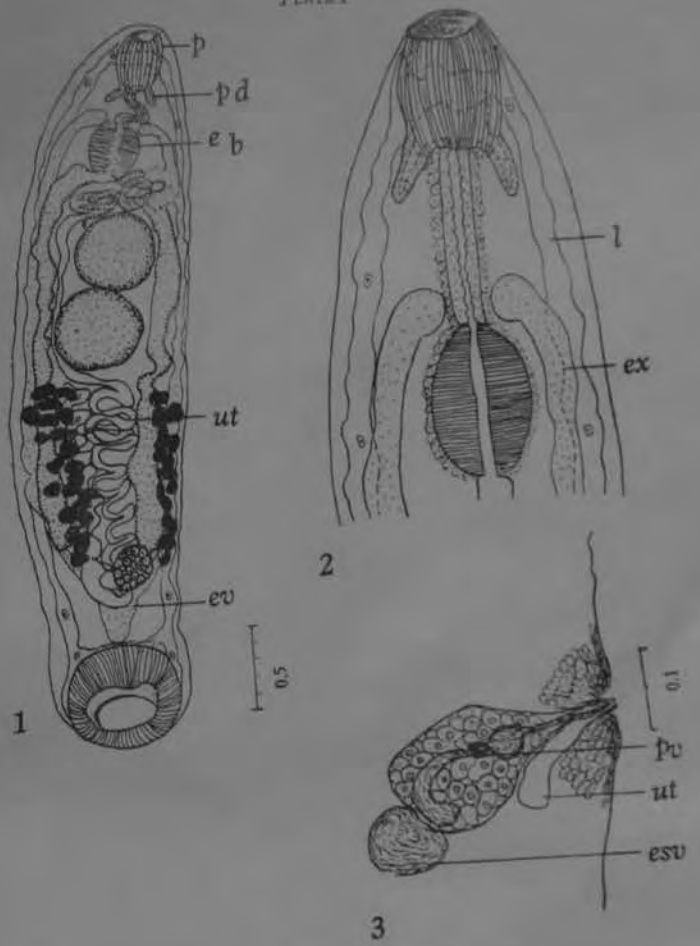
* Studies from the Department of Zoology, University of Nebraska, No. 305.
** Present address: Florida State Board of Conservation Marine Laboratory, Maritime Base, Bayboro Harbor, St. Petersburg, Florida.

Discussion: The genus *Cleptodiscus* Linton, 1910 contains the following species: *C. reticulatus* Linton, 1910 and *C. bulbosus* Hanson, 1955. Yamaguti (1953) placed the genus *Neocladorchis* Bhalerao, 1937, in synonymy with *Cleptodiscus*. Hanson (1955) accepted this view. *Neocladorchis poonaensis* Bhalerao, 1937 (type species), possesses 3 lymphatic vessels on each side of the body, as compared with 1 lymphatic vessel on each side of the body in *C. reticulatus*, *C. bulbosus*, and *C. kyphosi*. Until the significance of the number of branches of the lymphatic system is better understood, I prefer to retain the genus *Neocladorchis*.

Cleptodiscus kyphosi differs from *C. reticulatus* and *C. bulbosus* by possessing tandem anterior testes instead of testes oblique and more posterior, uterus dextral to testes instead of intertesticular, and sinistral rather than central genital pore. *Cleptodiscus kyphosi* further differs from *C. reticulatus* by possessing a spherical esophageal bulb as compared with esophageal bulb absent (replaced by a tube), and from *C. bulbosus* by lacking a strong band of sphincter muscles surrounding anterior border of pharynx.

Sagittal sections of *C. kyphosi* show that the ceca possess either cilia or microvilli, probably the latter. These structures are at present being studied further.

PLATE I



EXPLANATION OF FIGURES

Figures 1 and 3 were drawn with the aid of a camera lucida. The projected scale has value in millimeters. Abbreviations used: EB, esophageal bulb; ESV, external seminal vesicle; EV, excretory vesicle; EX, excretory canal; L, lymphatic vessel; P, pharynx; PD, pharyngeal diverticulum; PV, prostatic vesicle; UT, uterus.

FIGURE 1. *C. kyphosi*, ventral view.

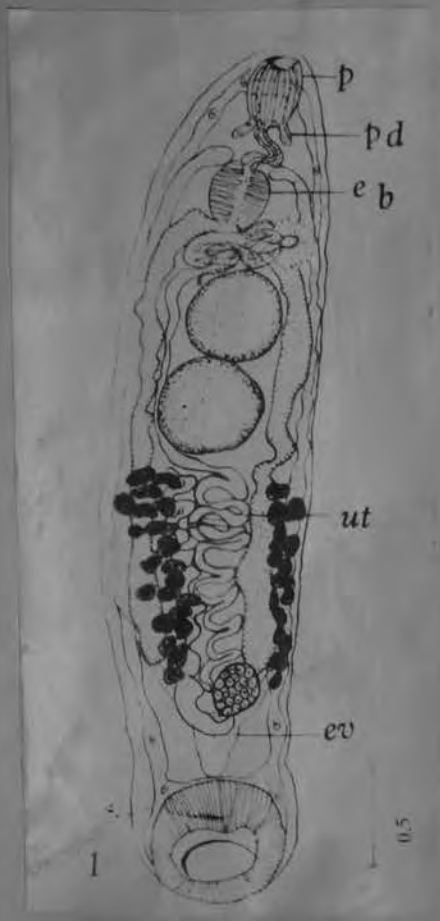
FIGURE 2. Schematic diagram of anterior end of *C. kyphosi*, ventral view.

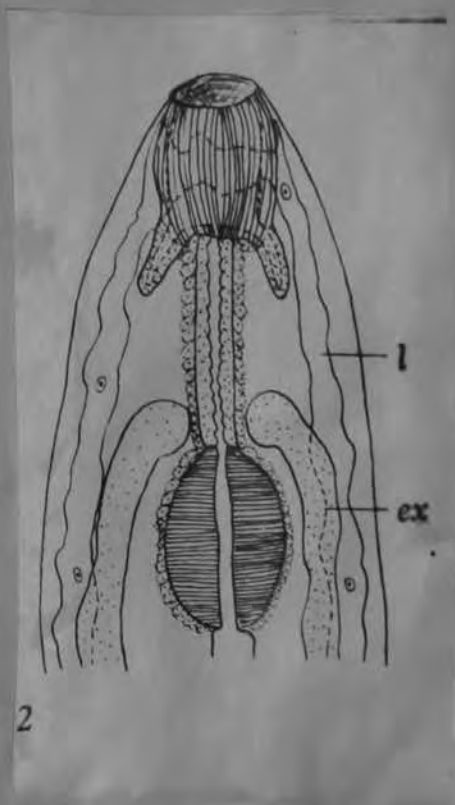
FIGURE 3. Sagittal section of *C. kyphosi*, showing terminal genitalia.

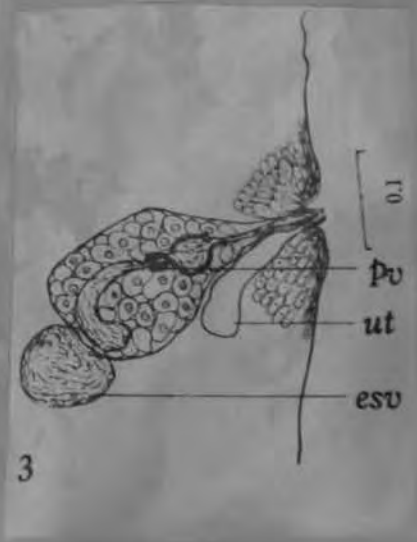
Bimini

Cleptodiscus kyphosi Sogandares in press

Host: Kyphosus# sectatrix Bimini







Macrorchitrematinae n. subfam. YAMAGUTI, 1958

Subfamily diagnosis. — Paramphistomidae: Body elongate or conical. Oral sucker without diverticles. Esophageal bulb present or absent. Acetabulum large, ventroterminal. Testes small or large, diagonal or tandem, intercecal. Cirrus pouch? Genital pore bifurcal or postbifurcal. Ovary median, postequatorial. Vitellaria extending whole length of ceca or along their greater posterior portion alone. Parasites of fishes.

Key to genera of Macrorchitrematinae

Esophageal bulb present; vitellaria extending whole length of ceca ..... *Pisciamphistoma*

Esophageal bulb absent; vitellaria extending along greater posterior portion of ceca ..... *Macrorchitrema*

Macrorchitrema Pérez Vigueras, 1940

Generic diagnosis. — Paramphistomidae, Macrorchitrematinae: Body conical. Acetabulum large, sessile, ventral, at posterior extremity. Oral sucker without diverticles. Esophagus of moderate length, without posterior bulb. Ceca half-long. Testes tandem, close together, pre-equatorial. Cirrus pouch? Genital pore at intestinal bifurcation. Ovary submedian, postequatorial, pre-acetabular. Vitellaria extending along posterior portion of ceca. Uterus occupying most of intercecal field and extending over anterior end of acetabulum. Excretory vesicle? Intestinal parasites of marine fishes.

Genotype: *M. havanense* Pérez Vigueras, 1940 (Pl. 30, Fig. 397), in *Holacanthus tricolor;* Havana.

Paramphistomidae

CLEPTODISCUS Linton,1910

Syn: MACRORCHITREMA Perez Vigueras,1940

Body conical. Acetabulum large, sessile, ventral, at posterior end. Pharynx without diverticles. Esophagus of moderate length, without posterior bulb. Ceca half-long. Testes tandem. close together, preequatorial/ Cirrus pouch ? Genital pore at intestinal bifurcation. Ovary submedian, postequatorial, preacetabular. Vitellaria extending along posterior portion of ceca. Uterus occupying most of intercecal field and extending over anterior end of acetabulum. Excretory vesicle ? Intestinal parasites of marine fishes.

type species: M.havanensis Vigueras,1940
Host: Holacanthus tricolor

Locality: Havana

Cable & Nahhas,1964 reduced this genus to synonymy with Cleptodiscus

Género **Macrorchitrema** Vigueras 1940

Macrorchitrema havanensis Vigueras 1940

(Fig. No. 36)

Este trematode fué encontrado en los intestinos del *Holacanthus tricolor*, pez abundante en el litoral Norte de La Habana.

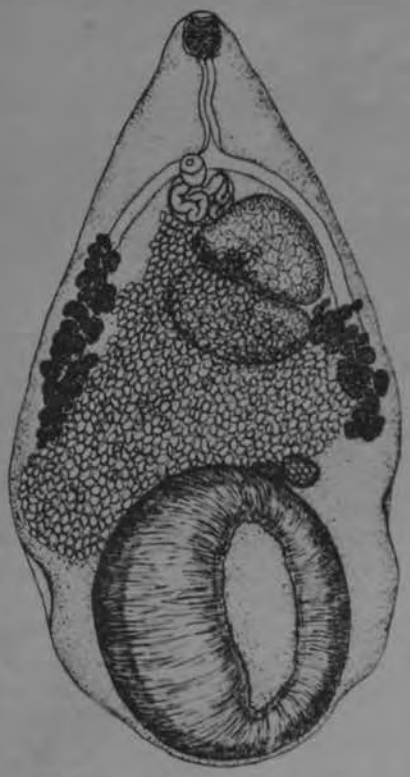


Fig. 36 – *Macrorchitrema havanensis*

Literatura:

Pérez Vigueras, I. 1940, — *Macrorchitrema havanensis* n. sp. (*Trematoda, Paramphistomidea*), Parásito del Intestino de *Holocanthus tricolor* Bloch (Pisces). Anales Inst. Biol. México. T. XI, No. 1, págs. 197-207, figs. 1-9.

Descripción. — El cuerpo es piriforme, blanco-rosado, cóncavo ventralmente, convexo dorsalmente, atenuado en su extremo anterior, redondeado en el posterior, de 2 a 2.8 mm. de largo por 0.8 a 0.9 mm. de ancho, cutícula gruesa y provista de espinas cortas más abundantes hacia el extremo cefálico y raras hacia la parte posterior del cuerpo. La ventosa oral es musculosa, presenta a cada lado un divertículo lateral subtriangular, es casi esférica, sin esfínteres, mide 250 a 270 mieras de largo por 200 a 230 mieras de diámetro transversal; el *oesophagus* es sinuoso, mide 350 a 400 mieras de largo por 40 a 45 mieras de diámetro, termina en un bulbo esofágico musculoso, a continuación le siguen dos ciegos intestinales que pasan los límites testiculares, pero no alcanzan la zona pre-acetabular. La ventosa posterior es grande, alcanza ⅓ del largo del cuerpo, es muy musculosa, mide 0.9 a 1 mm. de diámetro ántero-posterior por 0.7 a 0.8 mm. de diámetro transversal y 0.5 a 0.6 mm. de profundidad. Los dos testículos son pre-ecuatoriales, lisos, ligeramente esféricos, algo aplastados de delante a atrás, uno delante del otro, el anterior mide 560 por 290 y el posterior 510 por 270 mieras, la bolsa del cirrus está bien desarrollada, mide 300 a 310 mieras de largo por 110 a 120 mieras de ancho, la vesícula seminal describe numerosas asas, y el poro genital se encuentra en la línea media, a nivel de la bifurcación esofágica. El *ovarium* es post-testicular, inmediatamente pre-acetabular, a la derecha de la línea media, ovalado, liso, de 145 por 175 mieras de diámetro. Los folículos vitelógenos son gruesos y poco numerosos, situados a ambos lados del cuerpo, cecales y extra-cecales y a nivel del tercio medio del cuerpo. El *uterus* es dorsal, amplio, cargado de numerosos huevos, se extiende desde la región *pre-acetabular* hasta el nivel de bifurcación intestinal. Los huevos son elípticos, operculados, se encuentran en el *uterus* en distintos grados de desarrollo hasta embrionados, miden 60 por 38 mieras.

Cleptodiscus havanensis (Vigueras,1940) Cable & Nahhas,1964

FAMILY PARAMPHISTOMATIDAE
Fischoeder, 1901

The following species is identified as the one Pérez Vigueras (1940a) described as *Macrorchitrema havanensis*. In erecting the genus *Macrorchitrema*, he discussed various genera of amphistomes but did not mention *Cleptodiscus* with which *Macrorchitrema* is clearly synonymous. Our specimens and his were from the same host species and because his description is not complete or generally available, the species is redescribed as follows:

Cleptodiscus havanensis (Vigueras, 1940) n.comb. Nahhas & Cable, 1964

Synonym: **Macrorchitrema havanensis* Vigueras, 1940.

Host: Holacanthus tricolor (J).

Site: intestine.

Deposited specimen: U.S.N.M. 60258.

Description based on 3 specimens. Body broadly rounded posteriorly, tapering anteriorly, 4.57-5.79 long, 1.35-1.64 in maximum width. Cuticle thin, with a few minute spines near anterior end of body; eye-spot pigment present. Pharynx 0.233-0.266 long, 0.166-0.200 wide, with 2 retrodorsal diverticula. Ventral sucker at posterior end of body, 1.20-1.35 long, 0.965-1.06 wide, with longitudinal aperture. Esophagus 0.868-1.013 long, 0.040-0.060 in maximum width at muscular bulb near intestinal bifurcation, surrounded by gland cells along entire length; ceca not extending posterior to ovary. Testes 2, irregular to lobed, 0.466-0.714 long, 0.366-0.667 wide, diagonal, close together or separated by coils of uterus; anterior testis and cirrus sac near intestinal bifurcation; cirrus sac pyriform to spherical, 0.185-0.225 long, 0.135-0.180 wide, containing sinuous internal seminal vesicle, pars prostatica, prostate cells, and relatively short cirrus; sac followed by very long, convoluted seminal vesicle. Ovary smooth, 0.220-0.266 in diameter, near anterior edge of acetabulum, to right or left (in one specimen) of midline; seminal receptacle not evident; Mehlis' gland posterior to ovary; uterus mostly dorsal, between acetabulum and anterior testis. Genital pore midventral, at or slightly anterior to intestinal bifurcation. Eggs thick-shelled, more pointed at one end, 60-86 by 40-51 μ. Vitelline follicles in lateral fields, extending from anterior edge of acetabulum to about midlevel of anterior testis. Excretory system not observed. Lymphatic channels two, extracecal, extending from near posterior end of body to sides of oral sucker.

This species is distinguished from *C. reticulatus* Linton, 1910, by the much larger ventral sucker, its longitudinal aperture and the more anterior position of the testes and vitellaria. Hanson (1955) described a bipartite cirrus sac in *C. bulbosus*, a species which is more like *C. reticulatus* than the present one. In our specimens, the external seminal vesicle may be compactly coiled or not and, because of the adjacent membranes of the lymph channels and parenchymal vesicles, appears to be embedded in a relatively much denser tissue that could be mistaken for the posterior division of a bipartite cirrus sac.

CLEPTODISCUS
NEOCLADORCHIS

LOOSE LEAF
ORGANIZER

SCHEDULE

PERIOD OR TIME								
COURSE MON.								
INSTRUCTOR								
COURSE TUE.								
INSTRUCTOR								
COURSE WED.								
INSTRUCTOR								
COURSE THU.								
INSTRUCTOR								
COURSE FRI.								
INSTRUCTOR								
COURSE SAT.								
INSTRUCTOR								

NAME _____

ADDRESS _____

SCHOOL _____ TELEPHONE _____

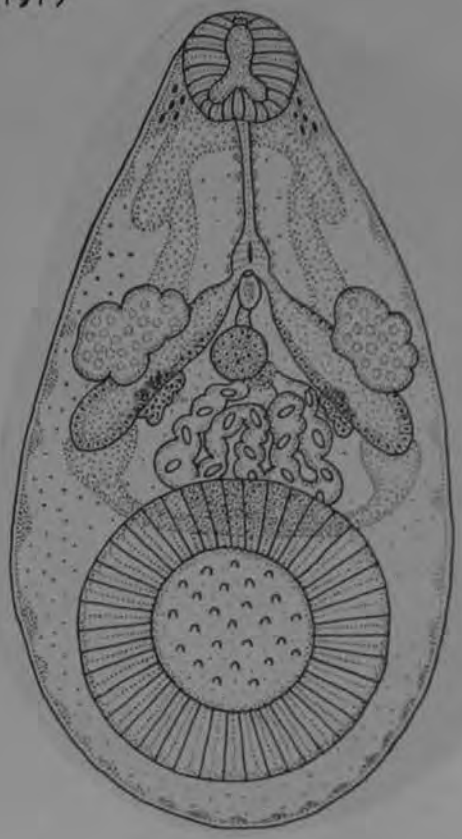
Colocladorchis ~~n. gen.~~ THATCHER, 1979

Diagnose Genérica: Paramphistomidae, Pseudocladorchiinae, com as características da família e subfamília. Corpo achatado, arredondado posteriormente, apontado anteriormente. Cutícula lisa. Ventosa oral arredondada, com divertículos pequenos dentro das paredes. Esôfago longo; bulbo esofagiano presente. Cecos largos, curtos, atingindo região equatorial. Acetábulo grande póstero-ventral. Poro genital mediano, a nível da bifurcação intestinal. Testículos fracamente lobados, paralelos e ventro-laterais aos cecos, no terço mediano do corpo. Bolsa do cirro e cirro presentes. Ovário esférico, intra-testicular. Glândulas vitelínicas constituídas por duas massas irregulares, póstero-dorsais aos testículos. Útero ocupando espaço entre ovário e acetábulo. Sistema circulatório presente. Vesícula excretora em forma de bolsa, poro dorsal. Ovovivíparos. Parasitas intestinais de peixes de água doce. Espécie tipo: *C. ventrastomis* n. sp.

Colocladorchis ventrastomis ~~n. sp.~~ THATCHER, 1979
(Fig. 1)

Hospedeiro: **Prochilodus reticulatus** Steindachner.
Habitat: Intestino.
Procedência: rios Media Canoa, Fraile e Jamundi, Colômbia (Valle).
Holótipo: Instituto Nacional de Pesquisas da Amazônia (INPA).
Parátipos: INPA e Museu de Zoologia da Universidade de São Paulo.

Diagnose específica (baseada em 10 exemplares): Com as características do gênero. Corpo medindo 0,71-1,53 (1,1) de comprimento e 0,40-0,89 (0,57) de largura. Ventosa oral com 0,11-0,19 (0,14) de diâmetro. Esôfago longo. Bulbo esofagiano medindo 0,08-0,11 (0,09) de comprimento. Cecos estendendo-se até 0,52-0,86 (0,67) da extremidade anterior. Acetábulo póstero-ventral, medindo 0,30-0,58 (0,41) de diâmetro. Testículos mais compridos que largos, medindo 0,11-0,22 (0,17) de comprimento e 0,094-0,14 (0,12) de largura. Pequena bolsa de cirro contendo cirro e células prostáticas presente; medindo 0,072-0,12 (0,09) de comprimento e 0,060-0,096 (0,078) de largura. Ovário esférico, medindo 0,050-0,13 (0,08) de diâmetro. Útero ocupando espaço entre ovário e acetábulo, pode estender-se dorsalmente ao acetábulo. Ovovivíparos. Ovos medem 36-49 por 60-66 (43 x 63) μ. Miracídios intrauterinos medem 53-95 por 85-142 (69 x 118) μ.



DISCUSSÃO

Colocladorchis ventrastomis n. gen., n. sp. aproxima-se mais do gênero *Pseudocladorchis* Daday, 1907, e da espécie tipo do mesmo, o *P. cylindricus* (Diesing, 1836), pela forma da ventosa oral, com pequenos divertículos dentro das paredes e pela posição dos testículos. A nova forma distingue-se de *P. cylindricus* em ter o ovário inter-testicular, as glândulas vitelínicas anteriores, compactas e um acetábulo maior e ventral em posição. A nova forma não tem papilas circundando a boca e é menor em tamanho. Além disso, o novo gênero procedeu de um hospedeiro diferente e de outro sistema de rios.

O nome genérico indica o país de origem do material, e o nome específico faz referência à posição ventral do acetábulo.

COLOCLADORCHIS

Key to subfamilies of Paramphistomidae from fishes

1. Oral sucker without diverticles ..... Macrorchitrematinae
   Oral sucker with diverticles 2
2. Oral diverticles projecting over outer surface of sucker ... 3
   Oral diverticles not projecting over outer surface of sucker 8
3. Esophageal bulb present 4
   Esophageal bulb absent 6
4. Testes single, acetabulum usually with central navel Diplodiscinae
   Testes symmetrical; genital sucker present 5
   Testes tandem; genital sucker absent ..... Dadaytrematinae
5. Body conical; oral diverticles forming claviform appendages; acetabulum unusually large, occupying whole expanded posterior end of body; genital sucker very large; testes extracecal ..... Nicollodiscinae
   Body elliptical; oral diverticles not so prominent; acetabulum large, wider than posterior end of body proper; genital sucker small; testes intercecal ..... Helostomatinae
6. Cirrus pouch absent 7
   Cirrus pouch present ..... Cleptodiscinae
7. Body linguiform, with a transverse ridge at neck, and a deep median notch at posterior extremity; acetabulum small ..... Kalitrematinae
   Body conical, without transverse cervical ridge or posterior median notch; acetabulum large ..... Dadayiinae
8. Esophageal bulb present; testes tandem; ..... Microrchiinae
   Esohpageal bulb absent; testes nearly symmetrical ..... Pseudocladorchiinae

The geographical distribution of the amphistomes of fishes will be discussed in a separate paper. It might be noted here, however, that no amphistome of freshwater fishes is known from Europe and the only one in North America (*Pisciamphistoma stunkardi* (Holl, 1929)) is of marine origin and not closely related to any of the South American species. Amphistomes do occur in Indian freshwater fishes; one of the nine species of India is of marine origin, the other eight being related to amphistomes of Africa and Brazil. Three species of amphistomes have already been described from African fishes.

FROM MANTER, 1962

Paramphistomidae of fishes

Discussion of Vaz (1932)

In dealing with the Paramphistomidae of fishes, for Amphistomum oxycephalum Diesing,1836, that Daday referred to Chiorchis, Stunkard to Pseudocladorchis and Fukui to Chiorchis (Chiorchis), Travassos (1921) erected the genus Dadaya (preoccupied), and posteriorly (Later ???) (1932) named Dadayatrema.

Chiorchis papillatus Daday,1907, should be placed as a synonym of D.oxycephala, in accordance with Stunkard,Travassos, Artigas, & Pereira.

The genus *Microrchis* was erected by Daday for two species, *ferrum-equinum* (Type) and *megacotyle*. Stunkard (1925) transferred *ferrum-equinum* to *Pseudocladorchis* and retained *megacotyle* in *Microrchis*. Stunkard calls attention to the possibility of *Microrchis* being a synonym of *Pseudocladorchis*, however he points out very clear differences between *M. megacotyle* and *M. ferrum-equinum:* in the situation of the genital apparatus which is placed farther anteriorly in *M. megacotyle*, and in the aperture of the excretory vesicle; these differences are sufficiently great to justify the placing of these species in different genera. Thus we consider it reasonable to retain the genus *Microrchis* with *M. megacotyle* as type, in view of the fact that *M. ferrum-equinum*, which was the type, has more affinity with *Pseudocladorchis*. Fukui, in his paper, states that Stunkard considers *Pseudocladorchis* a synonym of *Microrchis;* but by reading Stunkard's paper we could only conclude that he retains the genus *Pseudocladorchis*, in view of the fact that this author includes in this genus the species *oxycephalus, dilatatus, cylindricus, ferrum-equinum, pangasi, helostomatis* and possibly *quadrangulatas*.

The genus *Dadayus*, erected by Fukui should be retained, and there is no reason for changing this name, as proposed by Travassos (1932), because of its similarity to *Dadayia* (preoccupied).

The genus *Denticauda* Fukui (1929), is a synonm of *Parabaris* Travassos (1922), as this author pointed out in «Bol. Biol.» Fasc. 19, pg. 149. Thus two species are included in this genus: *P. parabaris* and *P. quadrangulatum*.

The Sub-family *Dadayinae* erected by Fukui for *Dadayus* and *Parabaris* should be retained, but *Parabaris* cannot be included in this subfamily, because of the absence of the acetabulum. It appears to us more reasonable to include in *Dadayinae* the genera *Dadayus, Dadayatrema, Microrchis* and *Pseudocladorchis*.

Parabaris diverges from all of the sub-families of *Paraphistomidae* and we propose for it the sub-family *Parabariinae* n. sub-fam.

Dadaytrematinae ~~n. subfam.~~ Yamaguti, 1958

Subfamily diagnosis. — Paramphistomidae: Body elongate oval to lanceolate. Acetabulum ventroterminal, not very large. Oral diverticles and esophageal bulb present. Testes more or less strongly lobed, tandem, in anterior part of intercecal field, with their lateral edges overreaching ceca or not. Cirrus pouch present. No genital sucker. Genital pore just postbifurcal. Ovary postequatorial. Vitellaria extending along posterior portion of ceca or more extensive. Excretory pore dorsal or anterior to acetabulum. Parasites of fishes.

Key to genera of Dadaytrematinae

1. Acetabulum with median notch on posterior margin; vitellaria limited to posterior portion of ceca ..... *Dadaytrema*

   Acetabulum without median notch on posterior margin ... 2

2. Vitellaria extending from testicular zone to beyond cecal ends, genital sucker present; uterus extending posterior to ovary ..... *Protocladorchis*

   Vitellaria extending from level of intestinal bifurcation to beyond cecal ends; genital sucker absent; uterus not extending posterior to ovary ..... *Orientodiscus*

Subfamily : DADAYTREMATINAE Yamaguti, 1958.

Subfamily diagnosis : Body elongate. Acetabulum ventroterminal, not very large. Oral diverticula and oesophageal bulb present. Testes strongly lobed, tandem, in anterior part of intercaecal field. Genital pore postbifurcal, genital sucker absent. Ovary postequatrial. Vitellaria lateral, extending along whole length of caeca or almost to it or restricted only to posterior part of caeca.

Mukherjee and Chauhan, 1965

Dadaytrema Travassos, 1931

Syn. *Dadavia* Travassos, 1921, preoccupied

Generic diagnosis — Paramphistomidae, Dadaytrematinae: Body lanceolate or flattened oval. Acetabulum ventroterminal, its ventral aperture may be notched on posterior margin. Mouth terminal, papillated around its opening. Oral sucker two-lobed posteriorly but not forming distinct appendages. Esophageal bulb present. Ceca somewhat undulating, terminating short of posterior extremity. Testes lobate, tandem, pre-equatorial, with lateral lobes overreaching ceca. Cirrus pouch present. Ductus hermaphroditicus? (observed by Daday). Genital pore postbifurcal. Ovary median, in posterior half of body. Vitellaria limited to posterior portion of ceca. Uterus intercecal, dorsal to testes. Excretory vesicle horizontal, with dorsal opening. Gastrointestinal parasites of fishes.

Genotype: *D. oxycephala* (Diesing, 1836) Travassos, 1931, syn. *Amphistoma oxycephalum* Dies., 1836; *Chiorchis oxycephalus* (Dies.); *Chiorchis papillatus* Daday, 1907 (Pl. 30, Figs. 388 & 389), in *Salmo auratus*, *S. pacu*, *Silurus megacephalus* at Cuyaba, *Salmo pacupeba* at Rio Panara and Rio Araguay — Diesing; also in *Salmo* sp., *Salminus maxillosus*, *Pimelodus*, *Colossoma*, *Mylossoma*, etc.; Brazil.

Other species:
D. elongatum Vaz, 1932, in *Myleus* sp.; S. America.
D. minimum Vaz, 1932, in *Myleus* sp.; S. America.

Dadaytrema Travassos, 1931

Diagnose Genérica: Paramphistomidae, Dadaytrematinae; com as caracteristicas da Familia e Subfamilia. Corpo alongado, cilíndrico. Cuticula lisa. Ventosa oral piriforme, com diverticulos prominentes projectando posteriormente. Boca terminal, circundada por pequenas papilas, e com vários circulos de papilas posterior à boca. Esôfago longo com pequeno bulbo esofagiano. Cecos longos, sinuosos, terminando perto ao acetábulo. Acetábulo subterminal. Poro genital mediano e pos-bifurcal; com ventosa genital. Testículos profundamente lobados, pre-equatoriais, intercecais e invadindo as áreas cecais. Bolsa genital contindo vesícula seminal presente. Cirro ausente. Ovário esférico, no último quarto do corpo. Canal de Laurer presente. Glândulas vitelínicas constituídas por poucos folículos pequenos, laterais ao ovário e dorsais aos cecos. Útero ocupa espaço intercecal entre ovário e testículos. Sistema circulatório de tubos longitudinais associados com os cecos e com dois seios anteriores e dois seios posteriores, associados com as ventosas. Vesícula excretora em forma de bolsa. Poro dorsal. Ovovivíparos. Parasitas de peixes de água doce. Espécie tipo: *D. oxycephala* (Diesing, 1836) Travassos 1931.

FROM THATCHER, 1979

Dadayia Travassos, 1921

Synonym: Dadaytrema Travassos, 1931
Junior Homonym: Dadayia Micoletsky, 1922 (n.n. for Bathylaimus Daday, 1905, (a nematode)

Travassos (1921) named the genus Dadayia. He later (1931) considered Dadayia Travassos, 1921, preoccupied and renamed it Dadaytrema. According to Neave (1939) this change was in error, Dadayia Travassos, 1921, having priority over Dadayia Micoletsky, 1922 (n.n. for Bathylaimus Daday, 1905, a nematode).

Revision

Dadayia oxycephala (Dies.,1836) Travassos,1921

Syn: Dadaytrema oxycephala (Dies.,1836) Trav.,1931

Also according to Heyneman et al, 1960:

Dadaytrema minima Vaz,1932
Dadaytrema elongata Vaz,1932

Travassos (1931) renamed his trematode genus Dadayia Travassos,1921, assuming Dadayia was preoccupied. According to Neave this change was in error. Dadayia Micoletsky,1922 (a n.n. pro Bathylaimus Daday,1905) is a nematode, but the Dadayia of Travassos has priority (1921).

Dadayia Trav., 1921 (nec. Dadayia Hansen) Syn: DADAYATREMA Trav., 1931 Biol. Biol. Fasc. 19, p. 148

Synonym: Dadaya Trav., 1921

Diagnosis (after Vaz, 1932). Dadayinae. Oral sucker with well developed, paired evaginations. Genital sucker rudimentary or absent. Testes two, lobed or branched, cecal and inter cecal, one behind the other at the middle of the body. Cirrus pouch present just behind the intestinal bifurcation. The round ovary lies in front of the acetabulum. Vitellaria posterior lateral, cecal and inter cecal, post-testicular. Uterus long, coiled, cecal and inter-cecal. The proximal end of the uterus is somewhat inflated with spermatozoa. Parasites of fishes.
Type species: Dadayatrema oxycephala (Diesing, 1836)

Dadayatrema oxycephala (Diesing, 1836) Travassos, 1932

Body flattened, rather attenuate cephalad, rather blunt caudad, lateral margins transparent. Anterior extremity surrounded or not by papillae, irregular in size and shape. The specimens measure from 3.5 mm. (immatures) to 7.6 mm (with numerous eggs) in length, 1.6 to 2.9 mm. in breadth. A muscular thickening is at the posterior end of the esophagus. The ceca proceeding posteriorly to the subcaudal region of the body; they are undulated at the level of the posterior testis and are at great distance from the lateral margins, as Daday has pointed out. In our specimens the ceca are 0.27 to 0.54 mm. distant from the margin. The testes, which lie one behind the other, in the middle of the body, are branched in all specimens. The vitellaria consist of a few follicles which extend anteriorly slightly in front of the ovary, at a great distance from the posterior testis; they are cecal and inter cecal. Uterus long and coiled, cecal and intercecal. A rudimentary genital sucker is present just behind the intestinal bifurcation.

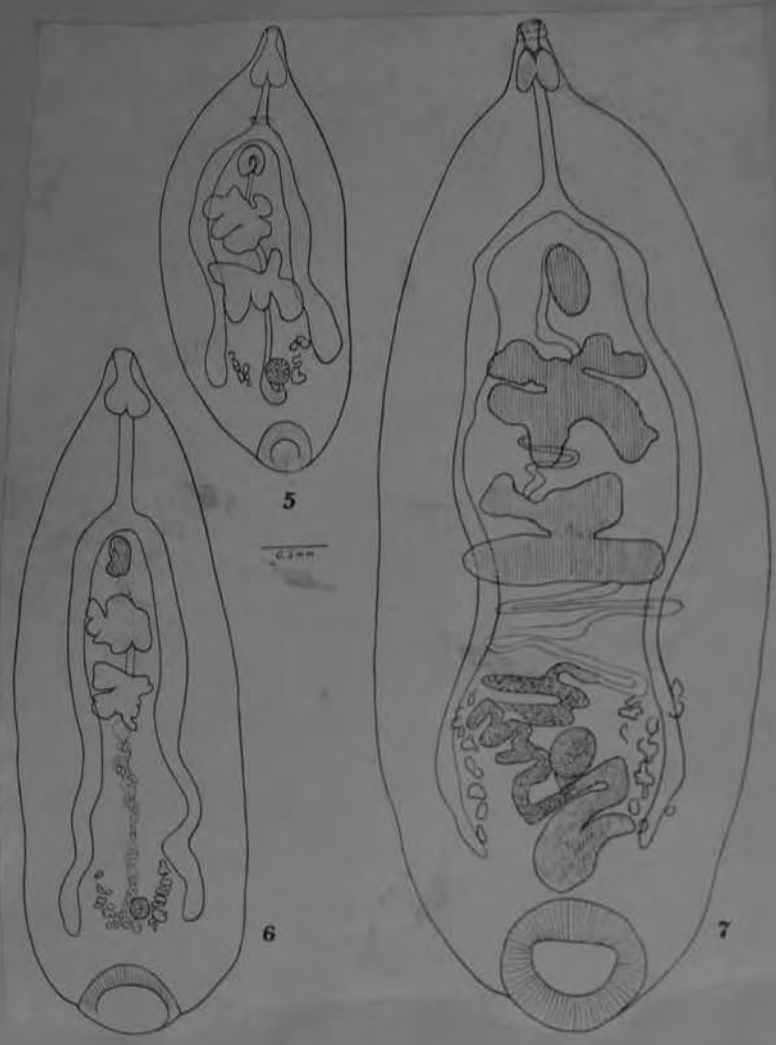
Habitat: Myleus sp. Pacu prata. Other hosts (see Trav., Artigs and Per. (Bull. Manaos)

Locality: River Paranapanema, S. Paulo, Brazil.

Measurements (in millimeters) of species of DADAYATREMA

Species	*D. oxycephala*	*D. elongata* n. sp.	*D. minima* n. sp.
Length	3,5 - 7,6	3 - 4,5	2 - 2,4
Breadth	1,6 - 2,9	0,95 - 1,7	1,3 - 1,5
Oral aperture	0,12 - 0,18	0,1 - 0,17	0,1
Oral evaginations	0,34 - 0,48	0,2 - 0,35	0,2 - 0,3
Oesophagus	0,56 - 0,84	0,3 - 0,4	0,1 - 0,14
Ceca from the lateral margins	0,3 - 0,54	0,06 - 0,16	0,08 - 0,1
Acetabulum	0,4 - 0,9	0,5 - 0,7	0,4 - 0,5
Genital sucker	0,2	absent	absent
Testes, length	0,54 - 0,65	0,2 - 0,5	0,2 - 0,3
Testes, width	0,82 - 1,5	0,5 - 1,4	0,6 - 0,9
Cirrus pouch, length	0,3 - 0,5	0,3 - 0,5	0,25 - 0,30
Cirrus pouch, width	0,2 - 0,3	0,16 - 0,24	0,12 - 0,16
Ovary	0,22 - 0,35	0,18 - 0,22	0,16 - 0,20
Eggs, length	0,128 - 0,157	0,115 - 0,153	0,111 - 0,136
Eggs, width	0,057 - 0,082	0,049 - 0,070	0,049 - 0,070

Para Vaz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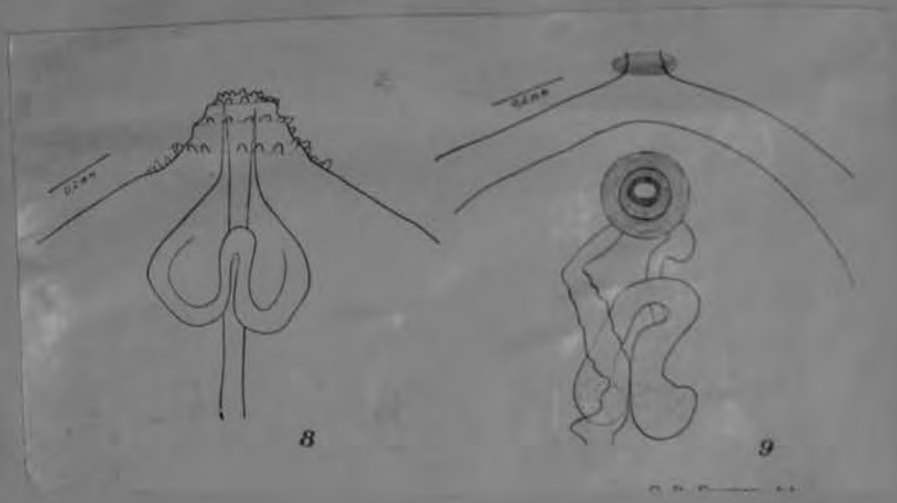
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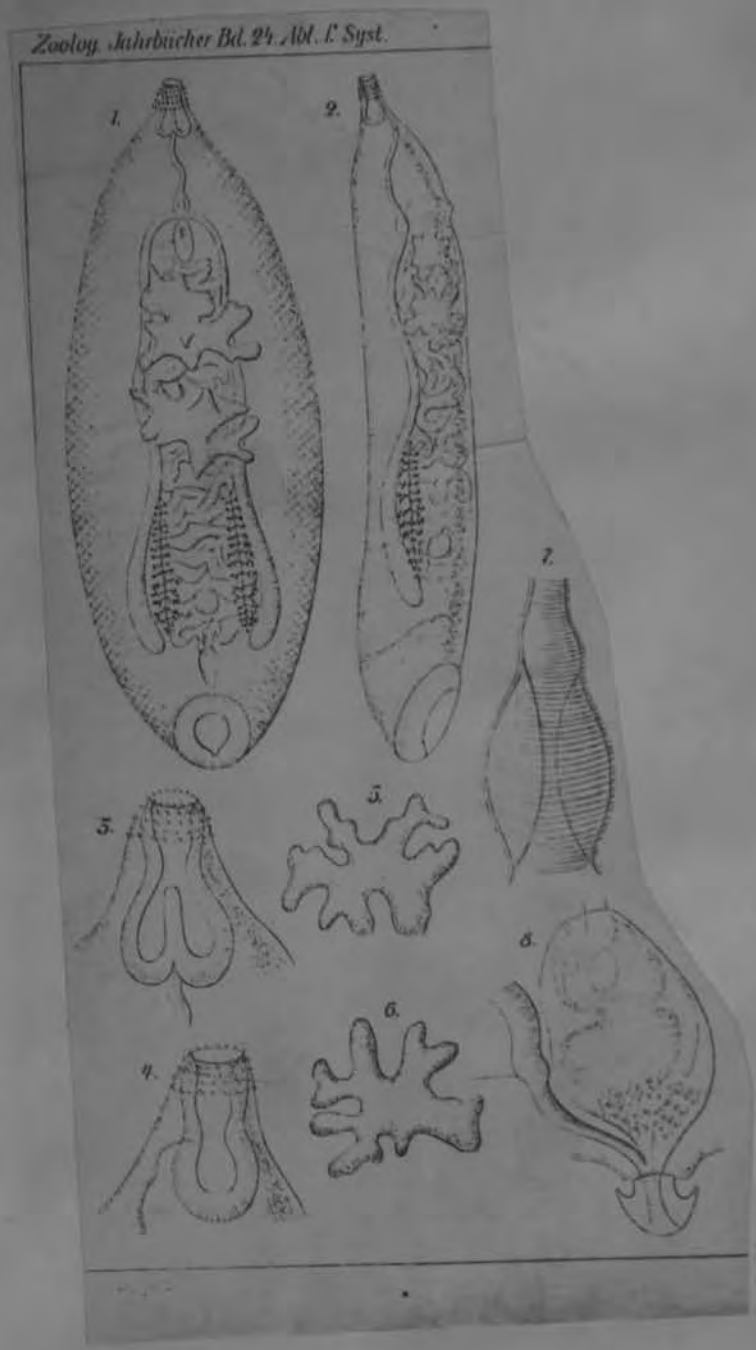
Dadayia oxycephalum (Diesing,1836)

Figures from Daday (1907)
Synonyms: Dadaytrema oxycephalum (Diesing,1836) Travassos
Chiorchis oxycephalus (Dies.)



Dadaytrema oxycephala (Diesing, 1836) Trav., Brasil 1931

Paramphistomoidea Stiles & Goldberg, 1910.

Dadayia Trav., 1922.

Cladorchinae. Sem ventosa genital; diverticulos da ventosa oral sem bulbo muscular; pharynge presente; vitellinos intra-cecaes e post-testiculares; testiculos no mesmo campo; ovario post-testicular.

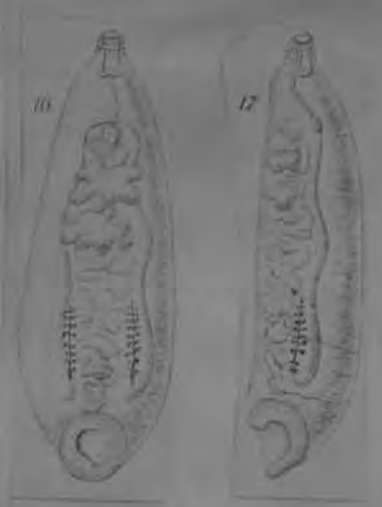
Especie typo: — *D. oxycephala* (Diesing, 1836).

Syn'. **Dadayia oxycephala** Diesing, 1839.

(Estampa 13, figs. 140 e 141)

Syn.: *Amphistoma oxycephalum* Diesing, 1836.
Chlorchis papillatus Daday, 1907.

A forma geral varia com a idade, com o desenvolvimento e com a retracção. Os exemplares jovens são geralmente cylindricos e bacilliformes. As dimensões do corpo oscillam tambem segundo a idade e o grau de contractura; o comprimento varia de 3,2 mm. a 9,5 mm. por um diametro transversal de 0,7 a 3,5 mm., e o diametro ventro-dorsal de 0,5 a 2,3 mm. O acetabulo fica na extremidade posterior e com a abertura voltada para a face ventral; a abertura acetabular é de contorno piriforme e mede de 0,2 a 0,9 mm. de diametro. A cuticula é lisa e mede de 0,007 a 0,010 mm. de espessura; em muitos exemplares encontra-se na extremidade anterior, no rebordo buccal, 5 a 6 fileiras transversaes de papillas que ora são digitiforme ora conicas. A abertura oral situada na extremidade anterior é elliptica tendo as margens lisas ou providas de papillas, mede de diametro 0,10 a 0,13 mm. A abertura oral communica directamente na ventosa oral que é piriforme e mede 0,7 a 1 mm. de comprimento por um maior diametro transversal de 0,3 a 0,4 mm., o menor diametro transversal é de 0,1 a 0,2 mm.; tem a porção posterior dividida em 2 lobos; a espessura da parede muscular varia de 0,05 a 0,06 mm.; os diverticulos da ventosa oral fazem saliencia

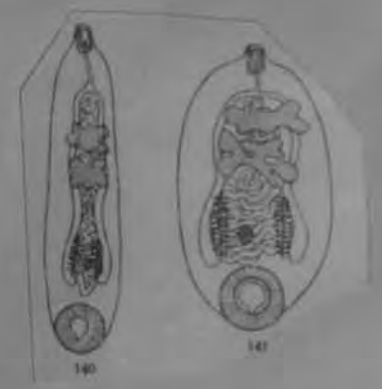


na superficie externa e são tubuliformes, medem de diametro 0,10 a 0,13 mm. O esophago tem origem no lado inferior da ventosa oral, entre os diverticulos, primeiramente dirige-se ventralmente e em seguida para traz, mede de 0,8 a 1,1 mm. de comprimento por 0,15 a 0,17 mm. de maior diametro, tem posteriormente um pharynge muscular. Cecos dirigidos para traz e afastados das paredes lateraes do corpo, são sinuosos, formando alças muito accentuadas sobretudo nos exemplares muito contraidos; medem de comprimento de 1,5 a 5,4 mm. Vesicula excretora situada entre a glandula da casca e o acetabulo, dirige-se para traz e para a face dorsal; o póro excretor fica situado a 0,5 a 1,1 mm. da abertura do canal de Laurer que é provido de um pequeno esphyncter. A abertura genital fica situada no terço anterior do corpo, atraz do bulbo esophagiano e a cerca de 0,8 a 1,5 mm. da ventosa oral; fica situado em uma saliencia em forma de verruga mas sem formar ventosa. A bolsa do cirro é piriforme ou oval e mede 0,3 a 0,8 mm. de comprimento por 0,1 a 0,5 mm. de largura; contem o cirro, glandulas prostaticas e a vesicula seminal. Os testiculos ficam situados na area intra-cecal e no mesmo campo, são ramificados, com ramos irregulares que são mais desenvolvidos nos exemplares velhos onde tornam-se digitiformes; o diametro varia de 0,1 a 0,4 mm. O ovario intra-cecal, fica a cerca de 1,2 a 1,4 mm. do acetabulo, é mais ou menos redondo e mede 0,26 a 0,40 mm. de diametro. O canal de Laurer é serpiginoso e a abertura fica situada a 0,5 a 1,1 mm. do póro excretor. O utero dirige-se primeiramente para traz e depois para diante, percorrendo a area intra-cecal e passando dorsalmente aos testiculos. Os ovos ellipsoides, com 0,07 mm. a 0,13 mm. por 0,05 a 0,07 mm. Vitellinos situados na area cecal ou intra-cecal, medem 0,9 a 1,23 mm. de comprimento, não attingem o fim da zona cecal; são arborescentes sendo os seus ramos mais curtos e numerosos na porção posterior; os folliculos são geralmente esphericos

Habitat: Intestino de *Salmo* sp.
Salminus maxillosus Cuv. & Val. (Dourado).
Pimelodus megacephalus.
Colossoma bidens (Agass.)
Mylossoma aureum (Spix).
Myletes torquatus Koer. (Pacúpeba).
Piaractus brachypomus (Cuv.) (Pacú).
Myleus sp. (Pacú).
Doras granulosus Val. (Armão ou abotoado).

Dexio geographica: Rio Cuyabá, Rio Paraguay, Rio Paraná collecionado por Naiterer. Rio Cuyabá collecionado por Travassos, Pinto e Muniz; Rio Mogy-Guassú (Ermac).

Desta especie resumimos a minuciosa descripção de Dadav, procurando adaptar a sua nomenclatura á que usamos.

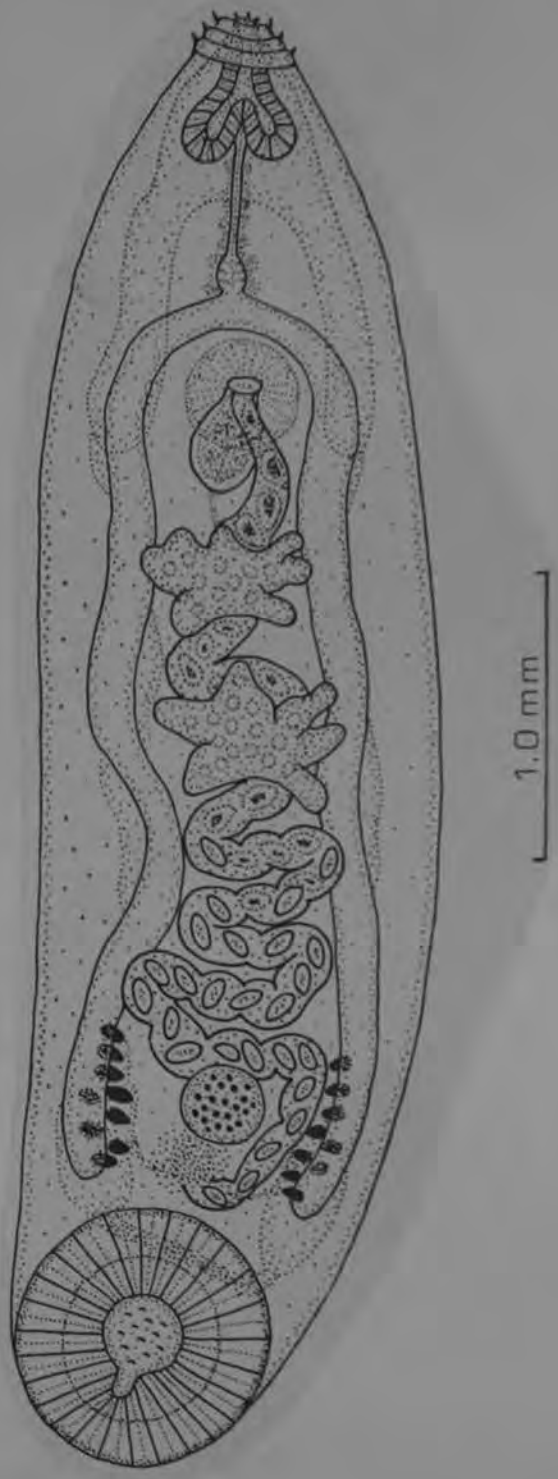


Dadaytrema oxycephala (Diesing, 1836) Travassos, 1931.

(Fig. 2)

Hospedeiro: **Colossoma bidens** (L.) "Pirapitinga".
Habitat: Intestino.
Procedência: Lago Janauacá, Manaus, Amazonas, Brasil.
Lâminas: Instituto Nacional de Pesquisas da Amazônia.

Diagnose específica (baseada em 10 exemplares): com as características do gênero. Corpo medindo 3,0-5,0 (3,7) de comprimento e 1,1-1,3 (1,1) de largura. Ventosa oral com 0,15-0,25 (0,19) de comprimento e 0,09-0,18 (0,13) de largura. Divertículos orais medindo 0,18-0,22 (0,19) de comprimento e 0,14-0,18 (0,16) de largura. Boca terminal, circundada de papilas com 4-5 μ de comprimento, e com quatro a cinco círculos de papilas posterior à boca. Esôfago longo, envolvido com células glandulares. Pequeno bulbo esofagiano presente. Cecos medindo 0,13-0,18 (0,14) de largura. Acetábulo com 0,56-0,90 (0,65) de diâmetro e com uma depressão no bordo posterior do orifício. Testículos mais largos que compridos, medindo 0,43-0,86 (0,50) de largura e 0,26-0,39 (0,29) de comprimento. Bolsa genital variável em tamanho medindo 0,18-0,40 (0,28) de comprimento e 0,11-0,27 (0,19) de largura. Ovos medem 60 x 90 μ. Miracídios medem 85-96 x 140-190 μ.



FROM THATCHER, 1979

Discussão

Existe na literatura muita confusão quanto à morfologia de *D. oxycephala*, advindo isso das dificultades em estudar formas tão grossos e cilíndricos. O presente estudo indicou a presença duma ventosa genital, duma depressão no bordo posterior do orifício do acetábulo e de quatro a cinco círculos de papilas atrás da boca. Nenhuma destas esrtuturas foram mencionadas na descrição mais recente (Travassos *et al.*, 1969).

Uma bolsa do cirro é citado como característica do gênero tanto por Yamaguti (1958) como também por Travassos *et al.* (Ibid.). É lógico supor que um trematódeo que tem ventosa genital não precisa dum cirro. A bolsa que esta espécie tem é apenas para conter a vesícula seminal e, porém, deve ser considerada como uma bolsa genital. O que serve a função do cirro nesta espécie é, em realidade, a parede interior do pequeno átrio genital que é evaginavel.

Heyneman, D., R. R. Brenes, C. Diaz-Ungria. 1960. Trematodos de Venezuela. II. Algunos trematodos de peces, reptiles y aves con descripcion de una nueva especie del genero Lubensa. Soc. cienc. nat. La Salle Caracas. Mem. 20: 138-149.

pp. 146-149

Subfamily: Schizamphistomatinae Looss, 1912
Dadaytrema oxycephala (Diesing, 1836) Travassos, 1934

(Figure 4)

We studied 3 total mounts. The body is cylindrical, flattened dorsoventrally and with the posterior extremity much wider than the anterior. It measures 9.998 to 11.696 mm. long by 2.620 to 3.164 wide. The cuticula, with the exception of the buccal region, is smooth. The acetabulum is strongly muscular and terminal; measures 1.513 to 1.651 long by 1.527 to 1.788 wide. In the buccal region one observes several series of digitiform or conical papillae. The mouth is ellipsoidal, smooth or papillated, with an aperture 0.137 to 0.206. The oral sucker is pyriform and measures 0.123 to 0.137 long by 0.247 to 0.297 wide.

The buccal diverticula are well developed and measure 0.481 to 0.550 long by 0.160 to 0.165 wide. The esophagus begins in the ventral part of the mouth and in front of the two diverticles and is directed posteriorly and terminates by means of a bulb at the beginning of the intestinal ceca; measures 1.513 to 1.926 long by 0.137 to 0.151 wide. The ceca are slightly sinuous and directed laterally and symmetrically the length of the body, reaching a distance 1.032 to 1.100 from the ventral sucker and measure 6.058 to 7.155 long by 0.137 to 0.220 wide. The genital pore is situated posteriorly to the esophageal bifurcation, genital sucker absent, 2.122 to 2.545 from oral aperture. The testes are located in the same field, one anterior and the other posterior, lobed and with digitiform ramifications that surpass the intestinal ceca. The anterior testis measures 1.167 to 1.69 long by 2.270 to 2.476 wide; posterior measures 1.169 to 1.513 long by 2.064 to 2.400 wide.

The cirrus sac is oval and well developed, measures 0.688 to 0.853 long by 0.481 to 0.550 wide and contains, in its interior, a coiled seminal vesicle, prostatic glands, cirrus and ejaculatory duct.

The ovary is slightly ovoid and lies to the left of the median longitudinal line and near the cecum of the same side; distance from the ventral sucker 0.825 to 0.894, and 2.140 to 2.545 from the posterior testis; measures 0.242 to 0.344 long by 0.481 to 0.509 wide Laurer's canal present.

The vitelline glands are formed in follicles, subspherical or ramified, distributed in two extracecal columns, but nearer the inter nal border of each cecum and some scattered posterior to the ovary; measure 0.206 to 0.412 long by 0.110 to 0.192 wide.

The eggs are long and oval, measure 0.110 to 0.133 long by 0. to 0.068 wide.

Host: "Morocoto" (Colossoma macropomus)
Location: Intestine
Geographical Distribution: Camp Cecilia Magdalena, Rio Caura (State of Bolivar), Aturas (Federal Territory of the Amazon).
Specimens: In the Helminthological Collection, Department of Zoology, University of Californi at Los Angeles

Discussion: Referring to the works of Travassos (1934), Skrjabin (1949) and Yamaguti (1958), we arrived at the conclusion that our specimens correspond to Dadaytrema oxycephala (Diesing, 1836) Travassos, 1934.

Consulting the work of Vaz (1933) we think that the species he reported as new (Dadaytrema elongata and D. minima) correspon very well to the variations of D. oxycephala (Diesing, 1836) Travassos, 1934, since the differences are based only on details measurement that, in our opinion, do not hold specific value. I the present case there exists a great morphological resemblance. Moreover, these measurable differences may be accounted for by young specimens or, as noted by Ulmer (1952), a variation of pre in fixing the trematodes which can account for variations in the total size of the body with marked alteration in the morphology some organs.

From the Spanish summary: For the last, there is redescribed a interesting form of trematode Dadaytrema oxycephala (Diesing, 1 Travassos, 1934 collected from the intestine of "Morocoto" (Col macropomus) and the belief in the possibility that the other sp reported as new (D. elongata Vaz, 1932 and D. minima Vaz, 1932) synonyms of D. oxycephala (Diesing, 1836) Travassos, 1934.

From the English Summary: An interesting trematode, Dadaytrema oxycephala (Diesing, 1836) Travassos, 1934 from the intestine o the "morocoto," Colossoma macropomus, is also described. The reduction to synonymy of two previously described forms, Dadayt elongata Vaz, 1932, and D. minuta Vaz,1932 is also suggested.

The Dadaytrema oxycephala (Diesing,1836) of
Heyneman,Brenes, & Diaz-Ungria (1960)
From a characid fish, Colossoma macropomus in Venezuela

Figura 4
Dibujo de una preparación total de *Dadaytrema oxycephala* (Diesing. 1836) Travassos, 1934.

Brasil

Dadaytrema elongata, ~~n. sp.~~ Vaz 1932

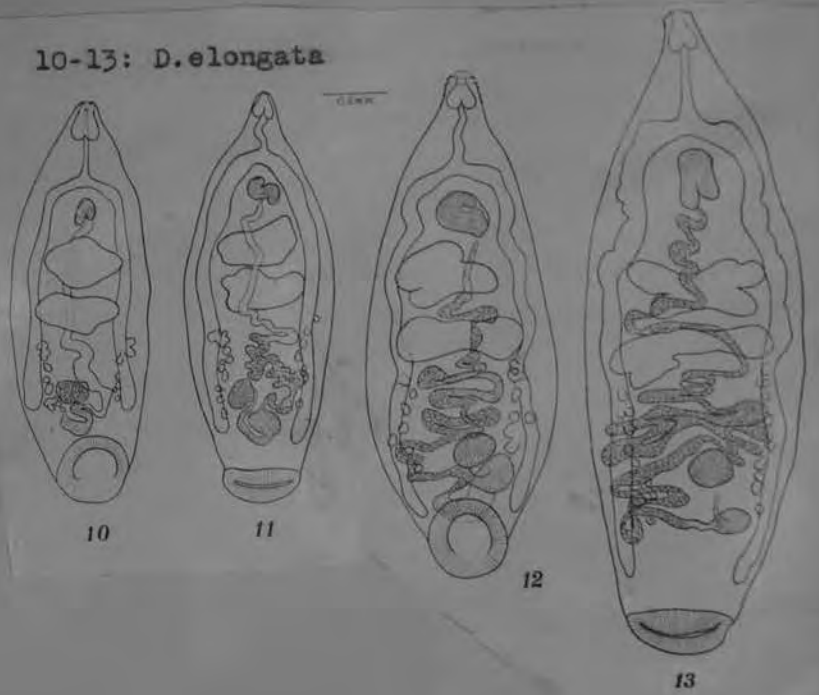
Diagnosis. Body flattened, attenuated anteriorly, lateral margins not transparent. Anterior extremity with or without papillae. The length of the body is 3-4,5 mm. (specimens with numerous eggs), the maximal breadth 1,7 mm. A muscular thickening present at the posterior end of the oesophagus. The ceca located near the lateral margins of the body (0,06-0,16 mm.) Testes globular or lobed. The vitellaria extend anteriorly just behind the posterior testes. A genital sucker was not observed.

Habitat: Myleus sp. (Pacú prata).

Geographical distribution: River Paranapanema, S. Paulo, Brasil.

Type and paratypes in the helminthological collection of the «Instituto Biologico de Defesa Agricola e Animal», S. Paulo, Brasil, n.o 460.

10-13: D.elongata



10 11 12 13

Brazil

Dadaytrema minima, ~~n. sp.~~ Jag, 1932.

We have found some hundred of specimens of this small species in the same host, that had the aspect of whitish grains of sand, measuring 1-2 mm. in diameter. Lateral margins not transparent.

The length of the body is 2-2,45 mm., the breadth 1,3-1,7 mm. Anterior extremity with or without papillae. A muscular thickening present at the posterior extremity of the oesophagus. The ceca located near the lateral margins of the body (0,1 mm.) Testes transversely elongated. Vitellaria posterior, lateral, not reaching to the posterior testes. Genital sucker absent.

Habitat: Myleus sp. (Pacú prata).

Geographical distribution: River Paranapanema, S. Paulo, Brasil.

Type and paratypes in the helminthological collection of the «Instituto Biologico de Defesa Agricola e Animal», S. Paulo, Brasil, n.º 461.

14-17. D. minima

Dadaytrema sphaerorchidum ~~n. sp.~~ THATCHER, 1963
Figure 1

Host.—*Dermatemys mawii* Gray.
Location.—Upper large intestine and lower small intestine.
Locality.—Fifteen miles south of Villahermosa, Tabasco, Mexico.
Holotype.—U.S.N.M. Hel. Coll. No. 60309.
Paratypes.—Hel. Coll. Instituto de Biologia, Mexico D. F.; Dept. of Zoology, Louisiana State University; author's collection.

Diagnosis.—With the characters of the genus. Body robust, muscular, with thick, nonspinous cuticle, tapering towards both extremities, 9.25 (3.28-9.75) long by 2.50 (1.30-2.78) wide, widest at level of posterior testis. Oral sucker barrel-shaped, with terminal aperture; 0.70 (0.51-0.70) long by 0.38 (0.36-0.45) wide. Oral aperture with cuticular rugae, which depend somewhat on state of contraction. Oral diverticula about 0.24 (0.15-0.28) long by 0.14 (0.08-0.14) wide. Oesophageal bulb 0.32 (0.17-0.37) in diameter. Intestinal caeca ending before reaching acetabulum, with posterior tips often directed medially. Acetabulum ventro-terminal, 1.0 (0.71-2.20) long by 1.05 (0.61-1.14) wide.

Testes tandem in position, situated pre-equatorially, roughly spherical in shape although sometimes showing weak lobation: anterior testis 1.08(0.57-1.14) long by 1.0(0.70-1.21) wide: posterior testis 0.98(0.57-1.05) long by 1.04(0.70-1.14) wide. Cirrus sac 0.33(0.25-0.50) long by 0.17(0.10-0.24) wide; containing unarmed cirrus and scattered prostatic cells. Position of genital aperture varying from level of intestinal bifurcation to slightly posterior thereto depending on state of contraction of worm. Genital sucker absent.

Ovary small, spherical, located at level of ends of caeca, 0.29 (0.17-0.30) in diameter and 0.86(0.23-0.89) in front of anterior border of acetabulum. Laurer's canal present. Uterus with one or two coils posterior to ovary before filling intercaecal area between ovary and testes. Vitelline system consisting of 30 to 50 follicles, roughly spherical, largely dorso-lateral to intestinal caeca, and extending from slightly post-equatorial level to ends of caeca: individual follicles measuring 0.09-0.19 in diameter. Eggs numerous, large, thin-shelled, operculate, 0.07-0.08 x 0.13-0.17. Eggs in terminal portions of uterus embryonated.

TABLE I.—Dimensional comparisons of *Dadaytrema sphaerorchidum* and *Dadaytrema oxycephalum* (in mm)

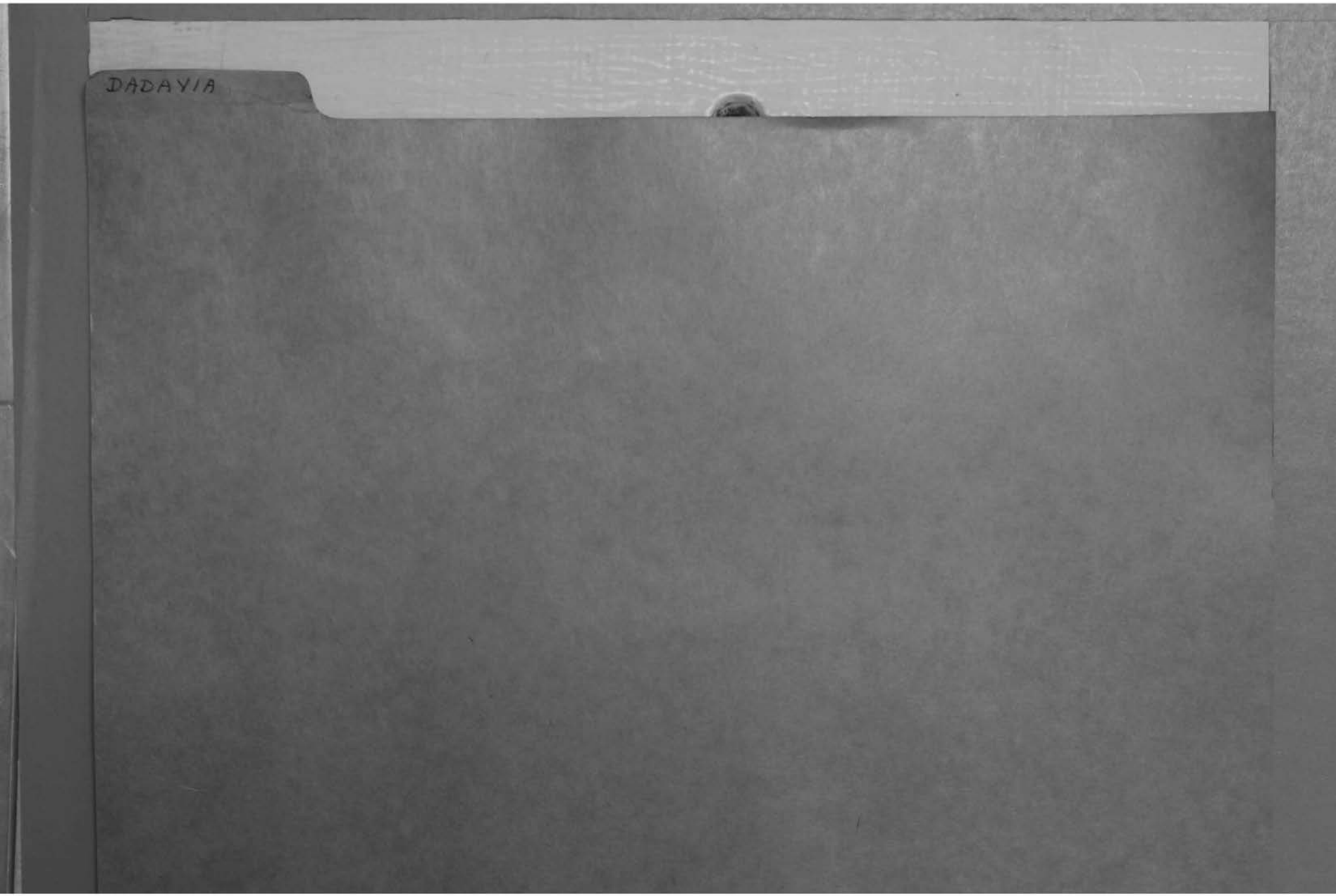
	D. sphaerorchidum	*D. oxycephalum*
Body:		
length:	3.28-9.75	2.2-9.5
width:	1.31-2.58	0.7-3.5
Oral sucker:		
length:	0.51-0.70	0.4-1.0
width:	0.36-0.45	0.3-0.4
Oral diverticula:		
length:	0.15-0.28	0.15-0.3
width:	0.08-0.14	0.1-0.13
Oesophageal bulb (diameter):	0.17-0.37	0.15-0.17
Acetabulum (diameter):	0.610-2.20	0.72-1.2
Anterior testis:		
length:	0.57-1.14	1.0-1.4 (diameter of central mass)
width:	0.70-1.2	(have ramifications extending 0.1-0.4)
Posterior testis:		
length:	0.57-1.05	
Cirrus sac:		
length:	0.25-0.50	0.3-0.8
width:	0.10-0.24	0.1-0.5
Ovary (diameter):	0.17-0.30	0.26-0.4
Ovary to acetabulum:	0.23-0.89	0.06-0.12
Egg:	0.07-0.08 x 0.13-0.17	0.05-0.07 x 0.07-0.13

Excretory bladder ovoid in outline, situated between ovary and acetabulum and communicating with outside via a short duct. Excretory pore situated on dorsal surface of body. Two main excretory ducts extend anteriorly from bladder, lateral and dorso-lateral to caeca.

Lymphatic system similar to that of other amphistomes, with three main channels running longitudinally on each side of body in close association with caeca; channels emptying into sinuses in vicinity of oral sucker and acetabulum. Lymphatic channels lying dorsal to caeca considerably larger than other ones. In some specimens these dorsal channels have expanded ovoid portions posterior to ends of caeca; enlargements corresponding in position and appearance to the "cuerpecitos" of Caballero (see *Schizamphistomoides resupinatus*, below).

Discussion.—The three previously described species in the genus were taken from fish hosts in Brazil. The present report is believed to be the first record of a species of *Dadaytrema* in a chelonian host, as well as the first record of the genus in Mexico.

D. sphaerorchidum differs from the other described species in having testes that are nearly spherical rather than being highly lobate. Of the three species, *D. oxycephalum* most closely resembles *D. sphaerorchidum* in size and appearance. As can be seen from Table I, *D. sphaerorchidum* has a relatively larger acetabulum and oesophageal bulb than does *D. oxycephalum*. Also, the eggs of the new species are considerably larger than those of *D. oxycephalum*.


DADAYIA

Dadayiinae nom. emend. for Dadayinae Fukui, 1929

Subfamily diagnosis. — Paramphistomidae: Body conical. Acetabulum large, ventroterminal, with transverse wrinkles at its bottom, and a median notch on posterior margin. Oral diverticles present. No esophageal bulb. Testes round, tandem, in midregion of body. Cirrus pouch absent. Genital sucker present, genital pore prebifurcal. Ovary median, posttesticular. Vitellaria along posterior portion of ceca. Excretory pore dorsoterminal. Parasites of fishes.

Dadayius Fukui, 1929

Generic diagnosis. — Paramphistomidae, Dadayiinae: Body conical. Acetabulum ventroterminal, large, with transverse wrinkles at bottom of lumen; its aperture with posterior median notch. Oral sucker with paired diverticles, which are, however, not so prominent as to form distinct appendages. Esophagus slender, without bulb. Ceca simple, reaching to acetabulum. Testes round, tandem in midregion of body. No cirrus pouch. Genital sucker present, opening in front of intestinal bifurcation. Ovary median, posterodorsal to posterior testis. Laurer's canal opening dorsally at level of ovary. Vitellaria extending along outside of posterior portion of intestine. Uterine coils intercecal. Excretory vesicle with dorsoterminal opening. Intestinal parasites of fishes.

Genotype: *D. marenzelleri* (Daday, 1907) Fukui, 1929, syn. *Diplodiscus m.* D. (Pl. 30, Fig. 396), in *Salmo* sp.; South America.

DADAYIUS Fukui,1929

Paramphistomidae: Body conical. Acetabulum ventroterminal, large, with transverse wrinkles at bottom of lumen; its aperture with posterior median notch. Pharynx with paired diverticles, which are, however, not so prominent as to form distinct appendages. Esophagus slender; without bulb. Ceca simple, reaching to acetabulum. Testes round, tandem in midregion of body. No cirrus pouch. Genital sucker present, pore in front of intestinal bifurcation. Ovary median, posterodorsal to posterior testis. Laurer's canal opening dorsally at level of ovary. Vitellaria extending along outside of posterior portion of intestine. Uterine coils intercecal. Excretory vesicle with dorsaoterminal opening. Intestinal parasites of fishes.

Type species: D. marenzelleri (Daday,1907) Fukui,1929.

Synonym: Diplodiscus marenzelleri Daday,1907

in Salmo species. South America (Brazil)

DADAYIUS

Dadaytremoides ~~n. gen~~ THATCHER, 1979

Diagnose Genérica: Paramphistomidae, Dadaytrematinae; com as características da Família e Subfamília. Corpo achatado, mais largo na região equatorial, apontando-se nas extremidades. Cutícula lisa. Ventosa oral grande, arredondada, com divertículos grandes projetando atrás. Esôfago longo; bulbo esofagiano bem desenvolvido. Cecos largos, longos, atingindo o terço posterior do corpo. Acetábulo subterminal. Poro genital mediano atrás da bifurcação intestinal; pequena ventosa genital presente. Testículos fracamente lobados, diagonais, em meio terço do corpo. Ovário esférico, mediano, entre as terminações dos cecos. Glândulas vitelínicas constituídas por poucos folículos pequenos, dorsais as terminais dos cecos. Útero ocupando espaço intercecal entre ovário e testículos. Sistema circulatório típico da Subfamília presente. Vesícula excretora em forma de bolsa; poro dorsal. Ovovivíparos. Parasitas intestinais de peixes de água doce. Espécie tipo: *D. grandistomis* n. sp.

Dadaytremoides grandistomis ~~n. sp.~~ THATCHER, 1979

(Fig. 3)

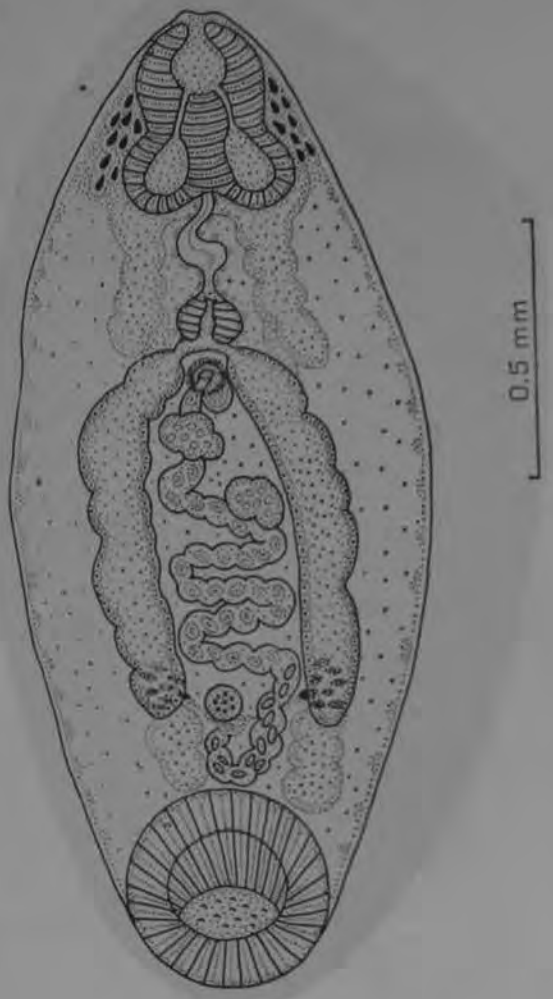
Hospedeiros: **Astyanax fasciatus** (Cuvier).
Chaetostomus leucomelas Eigenmann.

Habitat: Intestino.

Procedência: Rio Pance, Valle, Colômbia.

Holótipo: Instituto Nacional de Pesquisas da Amazônia (INPA).

Parátipos: INPA e Museu de Zoologia da Universidade de São Paulo.



Diagnose específica (baseada em 7 exemplares): Com as características do gênero. Corpo medindo 1,9-4,0 (2,6) de comprimento e 0,75-1,3 de largura. Ventosa oral com 0,22-0,64 (0,33) de diâmetro; divertículos medindo 0,14-0,22 (0,16) de comprimento e 0,09-0,14 (0,11) de largura. Boca terminal, circundada por pequenas papilas. Esôfago longo. Bulbo esofagiano medindo 0,09-0,14 (0,11) de diâmetro. Cecos medindo 0,16-0,22 (0,17) de largura. Acetábulo subterminal com 0,35-0,54 (0,46) de diâmetro. Testículos aproximadamente 0,19 de diâmetro. Bolsa genital pequena, com 0,14-0,23 (0,15) de comprimento e 0,09-0,16 (0,12) de largura. Ventosa genital medindo 0,12-0,18 (0,16) de diâmetro. Glândulas vitelínicas constituídas por pequenas folículas com 0,04-0,09 diâmetro. Ovos medem 36-45 x 72-90 μ. Miracídios intrauterinos medem 41-62 x 95-110 μ.

Discussão

Dadaytremoides grandistomis n. gen., n. sp. aproxima-se mais do gênero *Dadaytrema* e da espécie tipo do mesmo, *D. oxycephala*, em ter divertículos orais grandes e uma distribuição semelhante dos órgãos internos. Ambos gêneros também mostram papilas circundando a boca. A nova forma distingue-se de *D. oxycephala* por ser menor, além de ter uma ventosa oral grande e esférica, testículos diagonais pouco lobados e um bulbo esofagiano bem desenvolvido. Além disso, *D. grandistomis* não tem papilas posteriormente à boca como é característica do gênero *Dadaytrema*. As duas espécies foram encontradas em hospedeiros diferentes e em sistemas de rios separados.

O nome do gênero indica a relação do mesmo com *Dadaytrema* e o nome específico refere ao tamanho maior da ventosa oral.

DADAYTREMATOIDES

Helostomatinae Skrjabin, 1949

Subfamily diagnosis. — Paramphistomidae: Body elliptical. Oral diverticles forming very prominent claviform appendages. Esophageal bulb present. Acetabulum large, wider than posterior end of body proper. Testes symmetrical, intercecal; cirrus pouch and genital sucker present. Genital pore behind oral sucker. Ovary postequatorial. Vitellaria lateral, extending whole length of ceca. Uterus passing between two testes. Parasites of fishes.

Helostomatis (Fukui, 1929)

Generic diagnosis. — Paramphistomidae, Helostomatinae: Body approximately elliptical, with more or less pointed anterior extremity. Acetabulum [1]) large, ventroterminal. Oral diverticles long, in form of claviform appendages; esophagus with bulb. Ceca terminating short of posterior extremity. Testes symmetrical, intercecal, in midregion of body. Cirrus pouch and genital sucker present. Genital pore just behind oral sucker, nearer to anterior extremity than to intestinal bifurcation. Ovary postequatorial, median or submedian. Vitellaria extending in lateral fields from level of intestinal bifurcation or esophageal bulb to cecal ends. Uterine coils intercecal, passing between two testes. Excretory vesicle bifurcating anteriorly, with dorsal opening. Parasitic in stomach and intestine of fishes.

Genotype: *H. helostomatis* (MacCallum, 1905) Travassos, 1934 (Pl. 30, Fig. 387), in stomach of *Helostoma temmincki;* Palembang, Sumatra and S. America.

Other species: *H. sakrei* Bhalerao, 1937, in intestine of *Labeo calbasu;* Poona.

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[1]) Acetabulum of genotype is shown by the original author in abnormal folded condition.

Paramphistomatidae

Helostomatis (Fukui, 1929) Travassos, 1934

Cladorchinae: Body elliptical. Oral sucker with diverticula. Posterior sucker with a dorsal hood anteriorly. Esophageal bulb present. Intestinal ceca extending posteriorly as far as the anterior border of posterior sucker. Genital pore pre-bifurcal. Genital sucker present. Cirrus sac present. Testes lobed, connubial, at about midbody. Laurer's canal present. Ovary entire or lobed, post-equatorial. Uterine coils inter-caecal. Vitellaria lateral, for the most part extra-caecal. Eggs few, large. Lymphatic canals three on each side.

Type-species: Helostomatis helostomatis (MacCallum, 1905)

**Helostomatis was named as a subgenus of Chiorchis by Fukui (1929). Travassos (1934) was the first to use it as a generic name.

From Manter, 1962

Laurer's canal present. Lymphatic canals three on each side. 0·074–0·082 × 0·042–0·044 mm. Bhalerao, 1937

Host.—*Labeo calbasu*. Apparent

Location.—Intestine.

Locality.—Poona (Bombay Presidency). H. sakrei

To accommodate the species described here it is found necessary to emend the diagnosis of *Helostomatis* Fukui, 1929 which has been raised to a generic status by Travassos (1934).

Emended diagnosis of *Helostomatis*.—Cladorchinæ: Body elliptical. Oral sucker with diverticula. Posterior sucker with a dorsal hood anteriorly. Œsophageal bulb present. Intestinal cæca extending posteriorly as far as the anterior border of posterior sucker. Genital pore pre-bifurcal. Genital sucker present. Cirrus sac present. Testes lobed, connubial, at about midbody. Laurer's canal present. Ovary entire or lobed, post-equatorial. Uterine coils inter-cæcal. Vitellaria lateral, for the most part extra-cæcal. Eggs few, large. Lymphatic canals three on each side.

Type-species.—*Helostomatis helostomatis* (MacCallum, 1905).

OVER

Sumatra

Helostomatis

Cladorchis helostomatis McCallum, 1905

Host: Helostoma temminicki, a ~~labrynith~~ fish in Palembang, Sumatra.
Family Anabantidae (f. water)

Size 3 by 1.5
Eggs).145 by 0.064
Compared with A. attenuatum

"The posterior sucker, as may be seen in the sketch, is the most conspicuous feature, being especially large and characterised by its curious, sinuous, puckered outline, three spout-like projections extending out backward. The sucker is capacious, rather thin-walled, and bounded in front by the hood-like anterior margin. The worms have been fixed in such a position that in one the dorsal surface is concave and the head end therefore turned

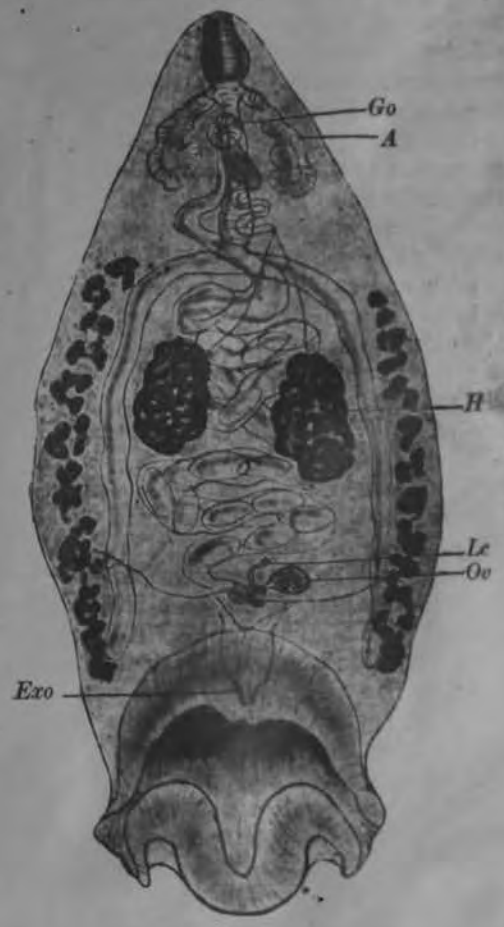

Fig. B.
Cladorchis helostomatis n. sp. from ventral surface
Lettering as in Fig. A.

Anabas in freshwater & in brackish water

Trichogaster rivers

Osphronemus freshwater

Polyacanthus freshwater

etc. etc. freshwater

Helostoma "

-OVER-

Travassos (1934) reported *Helostomatis helostomatis* (MacCallum, 1905) Travassos, 1934** in a synopsis of the Paramphistomatidae. No reference was made to the only previous records of this trematode (from Sumatra and India). The record from South America is probably an error. *Helostoma*, as an aquarium fish, has been imported into many parts of the world, and it is possible that Travassos collected *Helostomatis* in Brazil. If so, its occurrence there was clearly an introduction from tropical Asia, the native home of *Helostoma*.

FROM MANTER, 1962

CLADORCHINÆ Fischoeder, 1901.

Helostomatis (Fukui, 1929) Travassos, 1934.

Helostomatis sakrei n. sp. (Fig. 11.) Bhalerao, 1937

Only a single specimen obtained by Professor J. N. Karve from the intestine of *Labeo calbasu* at Poona was forwarded to me which on examination proved to be a new species of the genus *Helostomatis*.

The worm is almost elliptical with the anterior part slightly attenuated. Both the extremities are bluntly rounded, but the posterior one is slightly broader than the anterior. It measures 1·57 mm. in length and the maximum breadth which is attained at about the midbody is 0·73 mm. The cuticle is smooth and thick. The mouth is situated terminally on the ventral aspect and is surrounded by the oral sucker measuring 0·185 × 0·17 mm. At its posterior end the oral sucker has two large and stout diverticula which diverge postero-laterally. Each of the diverticulum measures 0·215 mm. in length and is divided into a comparatively thin anterior portion and a bulb-like posterior portion lined with thick cuticle and having powerful musculature. The posterior sucker is large and measures 0·8 mm. in diameter. Its anterior half is bounded by a hood-like margin. Posteriorly it is simple and rounded and is devoid of the "curious, sinuous, puckered outline, with three spout-like projections extending out backwards" as described by MacCallum in 1905 for the species *H. holostomatis*. The œsophagus is 0·8 mm. long and is lined internally with thick cuticle. Posteriorly it has a fairly thick, muscular bulb. The intestinal cæca are characteristically sinuous and terminate dorsally to the anterior face of the posterior sucker.

The excretory bladder opens posteriorly on the dorsal side almost above the centre of the posterior sucker. There are three lymphatic canals on each side, two of which lie internal to the intestinal cæcum and the third one is external to it.

The two testes are oval, lobed and measure 0·3–0·32 × 0·135–0·16 mm. They are symmetrical, situated immediately behind the intestinal fork and are in contact with the intestinal cæca externally. The vasa efferentia were not seen clearly. The vesicula seminalis externa lies on the right side of the œsophageal bulb. The cirrus sac is almost pear-shaped and small and measures 0·094 × 0·0525 mm. Inside the cirrus sac is the tubular vesicula seminalis interna which is slightly curved. It is followed by a flask-shaped pars prostatica. The genital pore is situated centrally, slightly posterior to the bifurcation point from which the oral diverticula diverge towards the sides. It is surrounded by a genital sucker.

The ovary measuring 0·13 × 0·06 mm. is trilobed and is situated centrally, immediately behind the zone of the testes. The shell gland is situated centrally, immediately posterior to the ovary and slightly overlaps the anterior border of the posterior sucker. The Laurer's canal is present. The uterine coils fill almost all the inter-cæcal space excepting that occupied by the genital glands and pass anteriorly on the left side of the œsophageal bulb. The vitellaria are extra-cæcal and extend from the level of the

-OVER-

anterior border of the œsophageal bulb to a distance slightly short of the terminations of the intestinal cæca. Posteriorly a few follicles overlap the intestinal caeca. The ova are large but few and measure 0·074–0·082 × 0·042–0·044 mm.

The only trematode with which the form described here is related is *Helostomatis helostomatis* (MacCallum, 1905). It, however, differs from this species in the structure of the posterior sucker, the position of the testes with respect to the intestinal bifurcation, the relative position of the testes and the ovary and in some minor respects. These points of difference being very distinctive, it is considered necessary to create a new species for its reception for which the name *Helostomatis sakrei* is proposed.

Specific diagnosis of *Helostomatis sakrei* n. sp.—Body elliptical. Length 1·57 mm. Breadth 0·73 mm. Mouth ventral. Oral sucker 0·185 × 0·17 mm. Oral diverticula 0·215 mm. long. Posterior sucker with a hood anteriorly, 0·5 mm. dia. Œsophagus with bulb 0·3 mm. long. Intestinal cæca sinuous, terminating at the anterior border of the posterior sucker. Testes oval, lobed, symmetrical, measuring 0·3–0·32 × 0·135–0·16 mm. Cirrus sac measures 0·094 × 0·0525 mm. Genital pore slightly behind the diverticular fork. Ovary trilobed, central, immediately posterior to the testicular zone. Shell gland immediately behind ovary. Laurer's canal present. Lymphatic canals three on each side. Ova 0·074–0·082 × 0·042–0·044 mm.

Host.—*Labeo calbasu*.

Location.—Intestine.

Locality.—Poona (Bombay Presidency).

To accommodate the species described here it is found necessary to emend the diagnosis of *Helostomatis* Fukui, 1929 which has been raised to a generic status by Travassos (1934).

Emended diagnosis of *Helostomatis*.—Cladorchinæ : Body elliptical. Oral sucker with diverticula. Posterior sucker with a dorsal hood anteriorly. Œsophageal bulb present. Intestinal cæca extending posteriorly as far as the anterior border of posterior sucker. Genital pore pre-bifurcal. Genital sucker present. Cirrus sac present. Testes lobed, connubial, at about midbody. Laurer's canal present. Ovary entire or lobed, post-equatorial. Uterine coils inter-cæcal. Vitellaria lateral, for the most part extra-cæcal. Eggs few, large. Lymphatic canals three on each side.

Type-species.—*Helostomatis helostomatis* (MacCallum, 1905).

FROM BHALERAO (1937)

Helostomatis sakrei Bhalerao, 1937.

Specific diagnosis : Body elliptical, measuring 1.57 x 0.73 mm. Mouth ventral. Pharynx measures 0.185 x 0.17 mm., diverticula 0.215 mm. in length. Acetabulum 0.5 mm. diameter, provided with a hood anteriorly. Oesophageal bulb present, 0.3 mm. long. Caeca sinous, terminating at anterior of acetabulum. Testes oval, lobed, symmetrical, measuring 0.3-0.32 x 0.135-0.16 mm. Cirrus sac measures 0.094 x 0.052 mm. Genital pore slightly behind diverticular fork. Ovary trilobed, central, situated immediately posterior to testicular zone. Ova 0.074-0.082 x 0.042-0.044 mm.

Text-fig. 1. *Helostomatis sakrei* Bhalerao, 1937. (After Bhalerao, 1937).

FROM: MUKHERJEE & CHAUHAN 1965

Host : *Labeo calbasu*.

Location : Intestine.

Distribution : Poona.

Paramphistomatidae

India

Helostomatis sakrei Bhalerao, 1937

Body elliptical

Length: 1.57 mm

Breadth: 0.73 mm.

Mouth: Ventral

Oral Sucker: 0.185 X 0.17 mm.

Oral Diverticula: 0.215 mm. long

Posterior sucker: With a hood anteriorly, 0.5 mm. in diameter.

Esophagus with bulb 0.3 mm. long

Intestinal Ceca sinuous, terminating at the anterior border of the posterior sucker.

Testes: Oval, lobed, symmetrical, measuring 0.3-0.32 X 0.135-0.16 mm.

Cirrus Sac: Measures 0.094 X 0.0525 mm.

Genital Pore: Slightly behind the diverticular fork.

Ovary: Trilobed, central, immediately posterior to the testicular zone

Shell Gland: Immediately behind ovary.

Laurer's Canal: Present

Lymphatic canals three on each side.

Ova: 0.074-0.082 X 0.042-0.044 mm.

Host: Labeo calbasu (Cyprinid)

Location: Intestine

Locality: Poona (Bombay Presidency).

N.B. Examine with hand lens!

HELOSTOMATIS